5-2006

Development of a Measure of Sport Injury Anxiety: The Sport Injury Appraisal Scale

Camille McLain Cassidy
University of Tennessee - Knoxville

To the Graduate Council:

I am submitting herewith a dissertation written by Camille McLain Cassidy entitled "Development of a Measure of Sport Injury Anxiety: The Sport Injury Appraisal Scale." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

Craig A. Wrisberg, Major Professor

We have read this dissertation and recommend its acceptance:

Jeffrey T. Fairbrother, Leslee A. Fisher, John W. Lounsbury

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Accepted for the Council:

Anne Mayhew
Vice Chancellor and
Dean of Graduate Studies

(Original signatures are on file with official student records.)

DEVELOPMENT OF A MEASURE OF SPORT INJURY ANXIETY: THE SPORT INJURY APPRAISAL SCALE

A Dissertation
Presented for the
Doctor of Philosophy
Degree
University of Tennessee, Knoxville

Camille McLain Cassidy
May 2006

DEDICATION

This dissertation is dedicated to my family.

If I had been given the opportunity to choose my family

I would have chosen all of you.

Thank you for your love and support and for being who you are.

ACKNOWLEDGEMENTS

My accomplishments would not have been possible without the help and support of so many people. I would first like to thank Dr. Craig Wrisberg, who has been such a positive influence in my life for the past three years. You have provided me with an example of the type of mentor I one day hope to be. Thank you for helping me, challenging me, and supporting me throughout this process. I would also like to thank Dr. Leslee Fisher, who has always been someone I could turn to for guidance. I am also thankful to Dr. Jeff Fairbrother. The thoughtful advice you have given throughout the past year has been greatly appreciated. An additional thank you to Dr. John Lounsbury for the guidance you have provided during the dissertation process. Finally, I would like to extend a thank you to Cary Springer, whose assistance made the dissertation process immensely more pleasant.

Although he was not on my committee, I would like to show my appreciation for Dr. Charles Thompson. There is not a day that goes by when I don't think of him and the lessons I learned from him. He left a permanent impression on the way I think and act, and I feel fortunate to have known him. He will be greatly missed.

Throughout my three years at UT I have been blessed to have so many great friends enter my life. I am eternally grateful to Taryn Morgan and Vanessa Shannon. You have both supported me in every way possible when I needed help and words cannot express what you both mean to me. You will forever be placeholders at my board of directors. I am also grateful for the friendships I have developed, at both UT and Penn State, with Ashwin Patel, Doug Muccio, Jon Metzler, Leanne Cherry, Matt Morgan, Noah Gentner, and Rob Bell. I feel lucky to have all of you in my life.

I would also like to thank my family for their constant love and support. To my mom, who has become one of my best friends. I am so happy that our relationship has developed into what it is today. To my dad, who first ignited my passion for sports and who has supported my efforts at every step along the way. Thank you for all of the encouragement you have provided. Finally, to my brother, for showing me that two people with so little in common can love each other so much. I wish you luck with everything to come. All of my accomplishments would mean nothing without having all of you to share them with. I love all of you very much.

ABSTRACT

The relationship between trait anxiety (TA) and injury incidence has been previously examined, but the results of these studies have, for the most part, been ambiguous. Results suggest that higher levels of TA are related to higher injury incidence in athletes; however, the exact relationship between anxiety and injury incidence remains unclear. One reason why only meager support exists for an anxiety-injury relationship may be the measures of anxiety researchers have utilized. Mandler and Sarason (1952) recommended that researchers construct situation-specific measures of anxiety that would allow more systematic examination of the relationship of various sources of anxiety to other variables (e.g., injury incidence). Although some attempts have been made to develop instruments that measure injury anxiety, to date no theoretically-based measure of sport injury anxiety (SIA) exists. Thus, the purpose of this study was to develop a theoretically-based and psychometrically reliable instrument to measure SIA. The Sport Injury Appraisal Scale (SIAS) was designed to measure several appraisals associated with athletes' experience of SIA. Participants included 300 collegiate athletes from various sports, all of whom completed a demographic questionnaire and a 51-item version of the SIAS. Results of an exploratory factor analysis revealed a reliable scale (α = .95) with 29 items and seven potential subscales, including anxiety associated with: (a) loss of athleticism (α = .89), (b) being perceived as weak (α = .90), (c) experiencing pain (α = .89), (d) loss of social support (α = .87), (e) letting down important others (α = .86), (f) reinjury (α = .87), and (g) having an impaired self-image (α = .81). Once confirmation of the proposed factor structure is completed a reexamination of the anxiety-injury relationship should be possible.

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I. Introduction

In this introductory section, a brief review of the literature regarding sport injury and anxiety is presented. The major topics include: (a) the relationship between anxiety and injury incidence, (b) current definitions of sport injury anxiety, (c) the conceptualization of sport performance anxiety (R. E. Smith & Smoll, 1990), (d) a new conceptualization of sport injury anxiety, (e) limitations of existing measures of injury anxiety/fear of injury, and (f) discussion of a new measure of sport injury anxiety. In addition, the purpose and hypotheses of the present study are presented. An expanded review of the literature can be found in Appendix A.

Introduction

Each year more than 70 million injuries in the United States alone call for medical attention and a reduction of activity (Williams, 2001). In the sport arena, nearly all athletes must deal with injury at some point in their career. With more than 17 million sport injuries per year (Booth, 1987) and almost half of all amateur athletes incurring an injury that prevents participation (Garrick & Requa, 1978; Hardy & Crace, 1990), understanding the cause and prevention of injury remains an important issue.

In 1988, Andersen and Williams developed a multi-component model of stress and injury based on the assumption that when an athlete experiences a stressful situation, his or her history of stressors, personality characteristics, and coping resources contribute to the stress response, either in isolation or in an interactive fashion. In their original model, Andersen and Williams proposed that several personality factors are related to injury incidence. Among these is trait anxiety (TA), which is defined as a general

disposition or tendency to perceive situations as threatening and to react with an anxiety response (Spielberger, 1966).

Within the field of sport psychology, cognitive appraisal models are typically used to explain the process of anxiety, especially as it relates to injury. Two popular models are Lazarus's cognitive-motivational-relational theory (CMRT) of emotion (1991a) and the injury-specific model of response to injury developed by Wiese-Bjornstal, Smith, Shaffer, and Morrey (1998). According to these theorists, athletes must make several cognitive appraisals for anxiety to result. First, athletes must determine whether the change (i.e., the injury) is relevant to their goals. Second, athletes must determine if the change helps or hurts their chances of successfully attaining their goals. Finally, athletes must ascertain which goals are at stake as a result of the injury. Thus, anxiety is presumed to result when an athlete perceives or anticipates a change in the environment and believes that aversive consequences will follow as a result of the perceived change.

The relationship between TA and injury incidence has been examined by scholars in sport psychology, but the results of these studies are ambiguous. Whereas researchers who have used non-sport-specific measures of TA (Kerr & Minden, 1988; Lysens, Van den Auweele, & Ostyn, 1986; Passer & Seese, 1983) have found no significant relationship between TA and injury incidence, those who have used sport-specific measures of TA have found that individuals with higher levels of TA are more likely to: (a) become injured, and (b) suffer from more severe injuries than athletes with lower levels of TA (Blackwell & McCullagh, 1990; Hanson, McCullagh, & Tonymon, 1992; Passer & Seese, 1983; Petrie, 1993).

Petrie (1993) examined the relationship of life stress, coping skills, competitive TA, and starting status to injury incidence in NCAA Division I-A football players. The results indicated that playing status moderated the effects of the other variables in predicting the number of days missed due to injury. For starters, 60% of the variance in days missed was accounted for by a combination of positive life stress, coping skills, and competitive TA. However, for nonstarters, no significant relationships were found.

Hanson and colleagues (1992) tested parts of the Andersen and Williams' (1988) model of the stress-injury relationship by examining both the frequency and severity of injuries in NCAA Division I and II track and field athletes. Of the variables they assessed before the season began, four (i.e., coping resources, negative life stress, social support, and competitive anxiety) accounted for 87% of the differences in severity of injuries. Of these, coping resources and positive life stress accounted for the biggest differences in the number of injuries athletes experienced.

Taken together, these results suggest that higher levels of TA are related to a higher incidence of injury in athletes; however, it appears that there is still much to be discovered about the relationship between anxiety and injury incidence. One reason researchers have found only meager results to support the injury-anxiety relationship may be that appropriate measures of anxiety have not been utilized. In 1952, Mandler and Sarason suggested that measuring anxiety as a general phenomenon contributes to a lack of predicted results and challenged researchers to construct and utilize situation-specific measures of anxiety. Despite the fact that sport psychology researchers have recognized the need to develop instruments that measure different components of sport anxiety, such as fear of injury and fear of failure (Hanson et al., 1992; Martens, Vealey, & Burton,

1990), no theoretically-based measure of sport injury anxiety has as yet been developed. Thus, the purpose of this dissertation was to develop a theoretically-based and psychometrically reliable instrument to measure the incidence and magnitude of sport injury anxiety.

Current Definitions of Sport Injury Anxiety

The phrase "fear of injury" is commonly mentioned in the sport psychology literature but is sometimes not defined (Kleinert, 2002). In other cases fear of injury is only vaguely defined. For instance, Dunn, Bouffard, and Rogers (1999) described fear of injury as a state "in which the athlete's primary concern focuses upon competitive factors that are strongly related to the possibility of getting hurt or injured" (p. 23). A more specific definition of fear of injury is available in the medical literature, where it is defined as "a condition in which the patient has an excessive, irrational, and debilitating fear of physical movement and activity, resulting in feelings of vulnerability to painful injury or reinjury" (Reneman, Jorritsma, Dijkstra, & Dijkstra, 2003, p. 278). Although these definitions provide a basic understanding of injury anxiety, a more appropriate sport-specific definition is needed. R. E. Smith and Smoll's (1990) conceptualization of sport performance anxiety offers a potentially fruitful model for the conceptualization of sport injury anxiety.

Sport Performance Anxiety

According to R. E. Smith and Smoll (1990), sport performance anxiety (SPA) can be defined as "a learned tendency to respond with cognitive and/or somatic state anxiety to competitive sport situations in which the adequacy of the athlete's performance can be

evaluated" (p. 421). Based on other models of emotion and anxiety (e.g., Lazarus & Folkman, 1984; Spielberger, 1966), R. E. Smith and Smoll's model suggests that the intensity and duration of the SPA response are influenced by the nature of the competitive sport situation (e.g., strength of opponent, importance of contest, presence of significant others), the athlete's cognitive and somatic sport-specific TA, and the individual's defensive operations, which are "processes [that] operate at the level of appraisal and in some way modify or distort the perception or appraisal of the situation" (R. E. Smith & Smoll, p. 421). If these defensive processes allow the individual to cope successfully with the situation, then that situation will be perceived as less threatening; if not, the opposite will be true.

In the conceptual model of SPA, the sport situation, levels of TA, and defensive operations are all believed to influence the performer's appraisals of the situation (R. E. Smith & Smoll, 1990). Four appraisals are especially significant: the appraisal of the situational demands, the appraisal of the individual's resources to deal with the situational demands, the appraisal of the nature and likelihood of potential consequences if the situational demands are not met, and the appraisal of what those consequences might mean to that individual. According to R. E. Smith and Smoll, an individual is likely to experience SPA if the following four appraisals are made: (a) the individual believes that the present situation is overwhelming, (b) that s/he has insufficient resources available to successfully deal with the situation, (c) that failure or disapproval from others is imminent, and (d) that his or her self-worth will diminish as a result of the failure. Appraisals such as these are likely to produce high levels of physiological arousal that will then produce even more negative appraisals.

The next step in this model involves the link between the SPA and the athlete's cognitive, physiological, and behavioral responses (R. E. Smith & Smoll, 1990). In the event that the individual makes positive appraisals of the situation, s/he is likely to experience task-relevant responses that facilitate performance. Conversely, if an individual makes negative appraisals s/he may experience task-irrelevant responses that have a debilitative effect on performance. These debilitative responses may include the inability to concentrate on the task at hand (cognitive response), levels of arousal that are not suitable to task performance (physiological response), and/or behaviors that are impulsive or inappropriate for task performance (behavioral).

Sport Injury Anxiety

Based on modifications of the definition of SPA presented by R. E. Smith and Smoll (1990), sport injury anxiety can be defined as *the tendency to respond with cognitive or somatic anxiety in sport situations where injury is seen as possible and/or likely*. For injury anxiety, intensity and duration of the anxiety response is presumed to be influenced by many of the factors that influence SPA. However, an athlete who experiences sport injury anxiety may also be influenced by his or her injury history, the severity of the previous injury, the amount of time that has elapsed since return to sport, and a variety of other injury-related factors.

As with SPA, there are a set of appraisals that an athlete must make for injury anxiety to occur. First, the athlete must perceive the situation as threatening in the sense that s/he believes that an injury is possible or likely. Second, the athlete must believe that s/he does not have the resources to meet the demands of the situation. For instance, an

athlete may have doubts that s/he has completely recovered from a previous injury and thus may believe that s/he does not have the physical resources necessary to successfully confront a potentially injurious situation. And third, the athlete must perceive that an injury would produce aversive consequences. For example, the athlete might perceive that the injury would be a form of failure in that it would indicate s/he is no longer capable (at least temporarily) of performing up to expectations.

It is presumed that when an athlete makes these negative appraisals and injury anxiety increases, s/he may respond in task-irrelevant ways. For example, in pilot interviews with injured athletes Cassidy and Morgan (2005) found that many, following their return to participation from an injury, were sometimes distracted by thoughts of reinjury rather than focused on the task at hand. These thoughts may produce heightened levels of physiological arousal that are debilitative to performance (Gould, Greenleaf, & Krane, 2002). Previously injured athletes may also engage in avoidance-type behaviors (Williams, 2001) such as balking (i.e., not completely following through a movement), bracing (i.e., simultaneously activating agonist and antagonist muscles), or hesitating (i.e., being slow to take action). Responses like these are not only likely to have a debilitative effect on performance but could also make the athletes more susceptible to sustaining another injury.

Limitations of Existing Measures of Injury Anxiety/Fear of Injury

To date, three measures of injury anxiety have been developed. They include one developed by Kontos, Feltz, and Malina (2000), a second called the Tampa Scale of Kinesiophobia (TSK; Miller, Kori, & Todd, 1991, cited in Silver, Haeney, Vijayadurai,

Wilks, Pattrick, & Main, 2002), and a third labeled the Sport Injury Trait Anxiety Scale (SITAS; Kleinert, 2002). The instrument developed by Kontos et al. was constructed for use with young athletes between the ages of 10 and 14 years only and may thus not be appropriate for use with college and elite-level athletes.

The TSK is a 17-item questionnaire that was designed for use with pain patients in order to measure excessive fear of (re)injury due to movement activities. Participants rate the extent to which they agree with or disagree with each of the items on a scale ranging from *strongly disagree* (1) to *strongly agree* (4). The TSK provides separate scores for harm, fear of (re)injury, importance of exercise, and avoidance of activity. TSK scores have exhibited acceptable factorial validity, internal consistency, and test-retest reliability (Silver et al., 2002; Swinkels-Meewisse, Swinkels, Verbeek, Vlaeyen, & Oostendorp, 2003; Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995; Vlaeyen, Kole-Snijders, Rotteveel, Ruesink, & Heuts, 1995). The primary limitation of the TSK is that it is designed for use chiefly with samples of individuals suffering from various forms of chronic pain (e.g., acute low back pain, chronic fatigue syndrome, fibromyalgia). To date, it has not been used with athlete populations.

The SITAS (Kleinert, 2002) was designed to measure dispositional anxiety related to injury but it appears to have several limitations. First, although the SITAS is purported to be a trait measure of injury anxiety, it contains three factors that represent situational appraisals. For instance, Kleinert hypothesized that injury anxiety is negatively related to situational competence and positively related to situational importance and situational loss of control. Since situational appraisals would be expected to vary considerably over time and across situations, the inclusion of such appraisals in

the SITAS compromises the trait conceptualization of the measure. Even if this were not the case, Kleinert's conceptualization of sport injury anxiety as a trait is contrary to the results of studies showing that negative feelings associated with injury decrease as the amount of time that has elapsed since the injury increases (McDonald & Hardy, 1990; A. M. Smith, Scott, O'Fallon, & Young, 1990). Thus, it appears that sport injury anxiety should be conceptualized as situational rather than stable. Other drawbacks to the SITAS include the finding that low situational competence has no relationship to TA and that many of the items on the SITAS lack face validity. For instance, the item "I notice that I am distracted" could be an appraisal made by athletes threatened by failure or by not performing well and is not unique to those threatened by injury.

The limitations of the existing measures of fear of injury/injury anxiety suggest that a conceptually sound measure of sport injury anxiety is needed. This measure should be based on the more prominent cognitive appraisal theories of emotion (Lazarus, 1991a; Wiese-Bjornstal et al., 1998) and be developed for use with college and elite-level athletes. It should also exhibit acceptable face validity, factorial validity, internal consistency, and external validity.

A New Measure of Sport Injury Anxiety

Based on Lazarus' (1991a) CMRT of emotion and the cognitive appraisal model proposed by Wiese-Bjornstal and her colleagues (1998), a self-report measure designed to assess sport injury anxiety should include items that place respondents in the context of injury (i.e., "When I am injured…;" Schwarz, 1999) and be capable of determining the strength of respondents' beliefs that aversive consequences will result from injury. The

Sport Injury Appraisal Scale (SIAS) was developed in the present study to measure 12 appraisals associated with injury anxiety. These appraisals were determined based on in-depth interviews with previously injured athletes' that revealed their perceptions of the consequences of injury (Cassidy & Morgan, 2005) as well as on the findings of earlier sport injury research (e.g., Chan & Grossman, 1988; Gayman & Crossman, 2003; Heil, 2000; Leddy, Lambert, & Ogles, 1994; A. M. Smith, Stuart, Wiese-Bjornstal, Milliner, O'Fallon, & Crowson, 1993; Taylor, 1997; Tracey, 2003; Udry, Gould, Bridges, & Beck, 1997; Udry, Gould, Bridges, & Tuffey, 1997; Weiss & Troxel, 1986). Four of the identified appraisals concern the aversive physical consequences of injury and include anxiety related to: (a) reinjury, (b) experiencing pain, (c) loss of normal functioning, and (d) loss of athletic ability. Four of the appraisals deal with the aversive psychological consequences of injury, including anxiety related to: (a) having a negative body image, (b) experiencing unpleasant affect, (c) losing potential, and (d) having an uncertain future. The final four appraisals concern the perceived aversive social consequences of injury and include anxiety related to: (a) experiencing social disconnect, (b) loss of social support, (c) others' perceptions of the athlete, and (d) letting important others down.

In order to establish the context for athletes' injury appraisals (Schwarz, 1999), each item on the SIAS begins with the stem "When I am injured." This places the athletes in the context of being injured and provides them with the information they need to appropriately respond to each item. Appraisals are anchored on a Likert-type scale ranging from *Strongly Disagree* (1) to *Strongly Agree* (5). The midpoint of the scale (3) is labeled *Neutral*. The scale yields a total injury anxiety score as well as a score for each factor comprising the scale. To determine the overall injury anxiety score, the ratings for

all items are averaged together to produce a single rating that ranges from one to five. The items for each factor are also averaged together to provide a single score for each factor that ranges from one to five.

Purpose and Hypotheses

The purpose of this research was to develop a valid and reliable measure of sport injury anxiety, the SIAS. In the first stage of this research, a panel of experts were invited to evaluate the content-relevance of a pool of items designed to measure the beliefs that injury leads to aversive consequences. In the second stage, a small sample of collegiate athletes completed the revised SIAS and their responses were analyzed to determine scale reliability. In the third stage, a large sample of collegiate athletes completed the SIAS. Responses were factor analyzed to evaluate the structure of the SIAS and to reduce the measure to a more manageable number of items.

It was hypothesized that athletes who had previously incurred more injuries (i.e., more than two) would experience higher levels of sport injury anxiety than athletes who had experienced either one injury or no previous injuries. It was also hypothesized that athletes who perceived their most recent injury to be very serious would experience higher levels of sport injury anxiety than athletes who perceived their most recent injury to be less serious. Finally, it was hypothesized that sport injury anxiety would be negatively related to the amount of time elapsed since the athlete's return to participation following an injury.

II. Scale Development

The purpose of this stage was to generate scale items and to determine how sufficiently each item measured its intended construct. Specifically, this stage consisted of item generation, expert raters completing a matching task to determine item content-relevance, and data analysis to identify any items needing alterations.

Forty-six items were initially generated for inclusion in the SIAS, with at least 4 items written for each of the 11 aversive consequences of injury *originally* identified. To increase the likelihood that the test would be relevant for future participants, quotes from an initial qualitative interview study (Cassidy & Morgan, 2005) were used to create many of the items (Dunn et al., 1999). For example, one item comprising the loss of normal functioning scale, "When I am injured, simple tasks become tedious," was based on the following quote from one of the interview participants who said, "I'd need people to get the doors for me. I mean I could do it, but it was a tedious task." Once the items had been generated the process of establishing item content-relevance could begin.

Method

Expert Raters

The participants included five female and three male Caucasian raters with an earned doctorate in counseling psychology (n = 2), kinesiology (n = 1), motor behavior (n = 1), or sport psychology (n = 4), and an average of 16.13 years of experience (SD = 11.45) as a professional in the field of sport psychology. All of the participants are currently employed as assistant (n = 3), associate (n = 2), or full (n = 3) professors in either a psychology (n = 2) or sport studies (n = 6) academic department at a four-year state university. All eight of the expert raters had worked with injured athletes, either

serving as a sport psychology consultant (n = 7) or as a coach (n= 1). The topic of injury was considered to be a primary research area for four of the raters and a secondary research area for one, whereas the topic of anxiety was considered to be a primary research area for one of the raters and a secondary research area for two.

Procedures

An information packet including an explanation of the study, instructions, a demographic questionnaire, and all materials necessary to complete the matching task were sent via electronic mail to each of the eight raters. All raters returned their assessments within two weeks of the original mailing.

A matching task for determining item validity (Hambleton, 1980) was utilized to ensure that the items on the scale were measuring the constructs they were intended to measure. In this task, the expert raters reviewed two lists: one with test items and one with descriptions of each factor. Prior to reading the items, the raters familiarized themselves with a brief description of each of the factors. The exact wordings of these descriptions were as follows:

> *Anxiety related to reinjury*. These are statements in which the athlete's primary concern focuses on the chances of becoming reinjured.
>
> *Anxiety related to experiencing pain*. These are statements in which the athlete's primary concern focuses on the likelihood of experiencing pain as a result of an injury.

Anxiety related to the loss of normal functioning. These are statements in which the athlete's primary concern focuses on not being able to do 'normal' tasks as easily when injured compared to when the athlete is healthy.

Anxiety related to the loss of athletic ability. These are statements in which the athlete's primary concern focuses on not being as athletically capable after the injury as the athlete was before the injury.

Anxiety related to experiencing unpleasant affect. These are statements in which the athlete's primary concern focuses on experiencing a disagreeable mood and temperament following the injury.

Anxiety related to having blocked goals. These are statements in which the athlete's primary concern focuses on not being able to achieve his or her goals at the time of injury or once the athlete has returned to participation.

Anxiety related to having an uncertain future. These are statements in which the athlete's primary concern focuses on not knowing what to expect. These statements focus on general uncertainties concerning the time and quality of the athlete's return to participation.

Anxiety related to experiencing social disconnect. These are statements in which the athlete's primary concern focuses on feelings of being separated and/or disengaged from the team.

Anxiety related to the loss of social support. These are statements in which the athlete's primary concern focuses on not having as many people around to depend on for social and emotional concerns.

Anxiety related to the loss of social status. These are statements in which the athlete's primary concern focuses on being evaluated as a weaker athlete as a result of the injury and on losing standing on the team.

Anxiety related to letting important others down. These are statements in which the athlete's primary concern focuses on the feelings that the athlete is disappointing important people as a result of the injury.

Once the raters familiarized themselves with these descriptions, they were asked to indicate which factor they thought each test item measured. The raters were also given the opportunity to provide qualitative feedback on any of the items.

Data Analysis

Screening for Discrepant Raters. For the matching task, a table was constructed displaying each judge's ratings of each item. A "0" was marked next to an item if the expert rater did not match the item to the factor it was intended to measure and a "1" was marked if the expert rater made the expected match. From these data, the percentage of matches made by each rater was calculated. Any rater whose percentage of matches was greater than one standard deviation away from the mean in the negative direction was considered a discrepant rater and his or her ratings were not used when evaluating the judges' ratings.

Evaluating Judges' Ratings. To assess item content-relevance, the percentage of matches was calculated for each item. It was established that a percentage match of greater than 70% indicated adequate item content-relevance. In the event that an item had

a percentage match of less than 70%, the item was either deleted or edited (based on the judges' qualitative feedback) to potentially increase its item content-relevance.

Results

Screening for Discrepant Raters

The expert raters' average percentage of matches across all items was .76 (*SD* = .08, range = .61 to .87). The results indicated the presence of one discrepant rater, whose data were subsequently removed from the analyses. Upon reexamination of the data, the raters' average percent of matches across all items rose to .79 (*SD* = .07, range = .72 to .87).

Quantitative Item Evaluations

Eleven of the 46 items failed to achieve a percentage match of at least .70 and were marked for further inspection. For the remainder of the items, the experts' ratings supported item content-relevance with a mean percentage match of .93 (*SD* = .10, range = .71 to 1).

Qualitative Item Evaluations

Experts provided little qualitative feedback. Based on her own applied work with injured athletes, one rater suggested the addition of a twelfth factor based on anxiety related to having a negative body image following injury. This rater also suggested changing the label for one factor from "anxiety related to the loss of social status" to "anxiety related to others' perceptions of me." One expert also suggested a change in the

label of a factor from “anxiety related to having blocked goals” to “anxiety related to the loss of potential.”

Final Scale Determination

Based on the quantitative results, five of the items were removed from the measure due to low item content-relevance. In response to the qualitative feedback, the two aforementioned factors were relabeled, resulting in the reassignment of eight items from their original factors to the two new factors. In addition, four items were added to assess anxiety related to having a negative body image after injury. Finally, six other items were added to ensure that each factor was comprised of at least three items.

Following these changes, all new or revised items were resubmitted to a sample of the original expert raters for review of their content-relevance. Two of the raters responded and their ratings were once again analyzed using the percentage match procedure. Results indicated that the raters had 100% agreement and matched all items to their intended factors. No qualitative feedback was provided. Based on these results, all modifications to the original items were accepted, yielding a total of 51 items for the original version of the SIAS (Appendix B).

III. Pilot Study

The purpose of the pilot study was to determine the overall scale reliability before conducting a large scale data collection. Cronbach's (1951) alpha was used to assess the consistency (DeVellis, 1991) of the overall scale as well as each of the proposed subscales. Nunnally (1978) and DeVellis have suggested that an alpha value of .70 is a sufficient measure of reliability, while a value higher than .80 is considered "very good" (DeVellis, p. 85).

Method

Participants

The participants were 21 male (n = 12) and female (n = 9) African-American (n = 1), Caucasian (n = 18), Hispanic (n = 1), and multiracial (n = 1) athletes competing at one NAIA university in the southeast United States who participated in the sports of baseball (n = 6), basketball (n = 3), golf (n = 2), soccer (n = 5), softball (n = 4), and volleyball (n = 1). The sample was comprised of sophomore (n = 4), junior (n = 7), and senior (n = 10) student-athletes who ranged in age from 19 to 23 years (M = 20.67, SD = 1.02). Participants reported having 7 to 18 years (M = 13.57, SD = 3.25) of experience competing in their respective sports. Nineteen of the participants indicated that they were starters or "Top 5" members on their teams. Of the 21 participants, 14 had experienced at least one acute (n = 10) or chronic (n = 4) injury during their collegiate careers. The mean number of injuries experienced by those participants was 2.08 (SD = 1.04, range = 1 to 4).

Of the 14 participants who had experienced an injury, two had been injured within the past two weeks, four had been injured between one and three months previously, two

had been injured between three and six months previously, six had been injured at least six months previously, and three had been injured more than one year previously. For their most recent injuries, eight participants were unable to participate for less than two weeks, two were unable to participate for between two weeks and one month, one could not participate for between one and three months, two were unable to participate for between three and six months, and one was unable to participate for between six months and one year. Although only two of the participants required surgery for their most recent injury, eight of the participants indicated that their injuries were at least "somewhat severe."

Instruments

The 51-item SIAS as well as a demographic questionnaire (Appendix C) that assessed age, gender, ethnicity, year in school, sport, and number of injuries experienced during the athlete's collegiate career were the instruments used in the pilot study. If a participant indicated that s/he had experienced an injury during his or her collegiate career, s/he also specified when the most recent injury occurred, what the most recent injury was, how long s/he was out of sport participation due to the injury, how recently s/he returned to participation following the injury, whether s/he had surgery for the injury, his or her perceived severity of the injury, and whether the injury was acute or chronic.

Procedures

Institutional approval to conduct the study was obtained prior to commencing data collection. The questionnaires were distributed to the participants by a sport psychology

professional who had been given specific instructions regarding their administration by the principal investigator. Following the completion of an academic class period, the participants were informed of the study's purpose. Athletes who were willing to participate in the study (no more than seven at one time) remained in the classroom and completed the questionnaire.

Prior to completing a paper-and-pencil form of the questionnaire, all participants were given complete directions regarding the study and were advised regarding their right to ask questions and/or to discontinue participation at any time. Subsequent completion of the SIAS constituted the participants' informed consent. On average, participants needed approximately 15 minutes to complete the questionnaire.

Data Analysis

The preliminary data analysis included description of the demographic data and the calculation of Cronbach's (1951) alpha for the entire scale as well as for each subscale using the Statistical Package for Social Sciences software.

Results

The obtained Cronbach's (1951) alpha revealed that the overall scale and the majority of the subscales had acceptable reliability. Specifically, the overall scale achieved an alpha value of .96. The 12 subscales and their respective alpha values (in parentheses) were as follows: anxiety related to having a negative body image (.68), anxiety related to letting important others down (.80), anxiety related to the loss of athletic ability (.67), anxiety related to the loss of normal functioning (.83), anxiety related to losing potential (.68), anxiety related to loss of social support (.79), anxiety

related to others' perceptions of me (.81), anxiety related to experiencing pain (.87), anxiety related to reinjury (.88), anxiety related to experiencing social disconnect (.82), anxiety related to having an uncertain future (.61), and anxiety related to experiencing unpleasant affect (.75).

Discussion

The purpose of the pilot study was to determine overall scale reliability prior to beginning the larger data collection process. The results indicated acceptable reliability for the overall scale and the majority of the subscales. Additional modifications to the scale were not made for two reasons. First, an acceptable level of reliability for four of the subscales may not have been achieved due to the extremely small sample size. Alpha values calculated for such small samples are typically not stable; that is, they are likely to change (either increase or decrease) with a much larger sample size. Similarly, correlations between items may have been due to chance (DeVellis, 1991). Thus, it was not deemed prudent to remove what appeared to be poor items because their correlations with other items may have been "attenuated purely by chance" (p. 78).

A second reason for not making additional modifications was the context in which the participants completed the SIAS (i.e., following the conclusion of an academic class). It is possible that the potential anxiety induced by the class had a carryover effect on the participants, thus altering the way in which they viewed and responded to the items. Taking into account these potential sources of error, it was not considered wise to delete any items based on the results of the pilot study. Consequently, the original 51-item version of the SIAS was maintained for subsequent administration to a larger sample.

IV. Larger Data Collection and Exploratory Factor Analysis

The purpose of this dissertation was to develop a theoretically-based and psychometrically reliable instrument to measure the incidence and magnitude of sport injury anxiety. Specifically, this study aimed to evaluate the factor structure and reliability of the SIAS and to reduce the length of the SIAS to a more manageable number of items. Additionally, comparisons were made to determine if certain groups of athletes differed on either the overall scale or any of the emergent subscales.

It was hypothesized that athletes who had previously incurred more than two injuries would experience higher levels of sport injury anxiety than athletes who had experienced either one injury or no previous injuries. It was also hypothesized that athletes who perceived their most recent injury to be very serious would experience higher levels of sport injury anxiety than athletes who perceived their most recent injury to be less serious. Finally, it was hypothesized that sport injury anxiety would be negatively related to the amount of time elapsed since the athlete's return to participation following an injury.

Method

Participants

Upon completion of the pilot study, the SIAS was administered to a larger sample of collegiate athletes. Several suggestions have been provided in the literature regarding the number of participants necessary to establish construct validity of an instrument. Specifically, Bryant and Yarnold (1995) recommended that the sample consist of at least 5 participants per item, whereas Tinsley and Tinsley (1987) recommended between 5 and 10 participants per item, up to 300. Hutcheson and Sofroniou (1999) suggested that the

sample include between 150 and 300 participants, Gorsuch (1983) proposed a sample of at least 200 participants, and Nunnally (1978) recommended at least 300 participants. For the purposes of this study, Tinsley and Tinsley's suggestion of including between 5 and 10 participants per item was applied.

The participants were 300 male (n = 135) and female (n = 165) African-American (n = 82), American (n = 1), Asian (n = 6), Caucasian (n = 171), East Indian (n = 1), European (n = 5), Haitian (n = 1), Hispanic (n = 6), Hawaiian (n = 1), multiracial (n = 13), Native American (n = 2), North American (n = 1), Pacific Islander (n = 1), and Samoan (n = 1) athletes (8 participants did not report their ethnicity) competing at the NCAA Division I (n = 245), NCAA Division II (n = 20), NCAA Division III (n = 31), and NAIA (n = 4) levels of competition. The participants competed in baseball (n = 11), basketball (n = 24), cheering (n = 1), cross-country/track and field (n = 66), diving (n = 1), field hockey (n = 3), football (n = 52), golf (n = 21), gymnastics (n = 3), lacrosse (n = 8), sailing (n = 6), soccer (n = 21), softball (n = 26), swimming (n = 19), tennis (n = 10), volleyball (n = 21), and wrestling (n = 8), with one participant identifying two sports as his primary sport. Participants competed at universities located in the midwest (n = 45), northeast (n = 45), northwest (n = 61), southeast (n = 142), and southwest (n = 7) regions of the United States. The sample comprised first-year (n = 76) sophomore (n = 65), junior (n = 81), senior (n = 72), and graduate (n = 6) student-athletes who ranged in age from 18 to 25 years (M = 20.15, SD = 1.46). Participants reported having 1 to 19 years (M = 9.65, SD = 3.95) of experience competing in their respective sports. One hundred fifty-seven of the participants indicated that they were starters, 174 indicated that they were members of the varsity team, 78 indicated that they were "Top 5" members on their teams, and 18

indicated that they belonged to none of these groups. Of the 300 participants, 215 had experienced at least one acute (n = 144) or chronic (n = 71) injury during their collegiate careers. The mean number of injuries experienced by those participants was 2.89 (SD = 3.82, range = 1 to 45).

Of the 215 participants who had experienced an injury, 24 had been injured within the past two weeks, 27 had been injured between two weeks and one month previously, 43 had been injured between one and three months previously, 47 had been injured between three and six months previously, 33 had been injured between six months and one year previously, and 41 had been injured more than one year previously. For their most recent injuries, 94 participants were unable to participate for less than two weeks, 51 were unable to participate for between two weeks and one month, 27 could not participate for between one and three months, 19 were unable to participate for between three and six months, 17 were unable to participate for between six months and one year, and seven were unable to participate for more than one year. Although only 36 of the participants required surgery for their most recent injury, 59 of the participants indicated that their injury was at least “very severe.”

Instruments

The 51-item SIAS and demographic questionnaire described previously were the instruments used in this study.

Procedures

The data were collected via the Internet with participants accessing the questionnaire electronically. An electronic message was sent to approximately 200

CHAMPS/ Life Skills administrators in the United States. The message included a description of the study and a request to complete the questionnaire, as well as the link to the online survey. The administrators were asked to forward the message to all student-athletes at their universities. Participants' responses were automatically entered into a database when they submitted the completed questionnaire.

All participants were given complete directions regarding the study prior to completing the survey. They were also advised regarding their right to discontinue participation at any time. Submission of the completed survey constituted the participants' informed consent.

Data Analysis

The preliminary data analysis included a summary of demographic information and descriptive statistics for scale items. Corrected item-total correlations, item means, and item variances were then calculated. Ideally, the items should have high item-total correlations, means close to the center of the range, and high variances (DeVellis, 1991). If an item had a low inter-scale correlation, had a mean that was not near the center of the range, or had a low variance, it was deleted from the scale. Once these analyses were completed an exploratory factor analysis was conducted.

Exploratory factor analysis (EFA) is a technique used to examine the interrelationships among variables (Carr, 1992; Hutcheson & Sofroniou, 1999) and allows for the reduction of a large number of correlated items to a smaller number of latent variables (Tinsley & Tinsley, 1987). These latent variables are often called factors and are used to "interpret the consistency in a data set" (Tinsley & Tinsley, p. 414). EFA

includes a principal components analysis that identifies the linear combination of all variables (or items) that accounts for the most variance (Stevens, 1996). It is also possible to rotate the data to allow for simplification of the factor structure (Thurstone, 1947). Thus, an EFA using principal components extraction and varimax rotation was conducted.

For the present study, three of the criteria identified by Tinsley and Tinsley (1987) were used to determine the number of components to rotate. The first criterion was the number of components with eigenvalues over 1.0. This ensured that factors were retained only if they explained more variance than the average amount of variance explained by one of the original items (DeVellis, 1991). The second criterion was the percentage of variance accounted for by the last factor. Although this is the "weakest" of the criteria, it makes practical sense; "factors that explain a very small percentage of the variance (e.g., 1%) are unlikely to be of either theoretical or practical significance" (Tinsley & Tinsley, p. 420). The final criterion was the percentage of total variance accounted for by the factor solution. The factor solution should explain a considerable amount of the variance (e.g., greater than 30-40%) but should not include factors that are uninterpretable.

Internal consistency was assessed using Cronbach's (1951) alpha. Alpha is one way to determine reliability and it assumes that the correlation among all possible items in a domain can be estimated by the average correlation between items (Nunnally & Bernstein, 1994). According to Nunnally and Bernstein, a total scale alpha of at least .80 is considered acceptable, whereas an alpha value of .70 is suggested for subscales (Nunnally, 1978).

Results

Preliminary Item Screening

Descriptive statistics for each item are presented in Table 1. All items were judged to have means close to the center of the scale, indicating that the items were able to detect values within the full range of the construct (DeVellis, 1991). Each item also had a sufficiently high variance, indicating that scores for each item were diverse. Additionally, all items had relatively high corrected item-total correlations. Based on these preliminary findings, no items were deleted prior to conducting the EFA.

Determining the Appropriate Number of Factors

To determine the appropriate number of factors underlying responses to the SIAS and the factor solution an EFA with principal components extraction and varimax rotation was conducted. Nine of the eigenvalues obtained were greater than 1.0. Thus, a series of EFAs was conducted extracting between one and nine factors.

The nine-factor solution was the most interpretable; however, this solution contained eight items that had a loading of greater than .40 on more than one factor (i.e., cross-loaded) and two items that did not have a loading of at least .40 on any factor (i.e., had a non-salient factor loading). Therefore, these 10 items were removed and a second EFA was conducted. The new eight-factor solution contained two items that cross-loaded on at least two factors and one item that did not have a salient factor loading. These three items were then removed and an additional EFA was conducted. The resulting eight-factor solution contained two items that cross-loaded on more than one factor and one factor comprised of three items that was not interpretable. Thus, these five items were

Table 1

Descriptive Item Statistics

Item	*N*	*Mean*	*SD*	*Corrected Item-Total Correlation*
SD1_1	300	3.92	1.16	0.43
UF1_2	300	3.14	1.16	0.49
P1_3	300	3.46	1.02	0.46
R1_4	300	3.64	1.11	0.54
LNF1_5	300	3.43	1.12	0.52
UA1_6	300	2.87	1.26	0.60
UF2_7	300	3.06	1.22	0.65
OPM1_8	300	2.48	1.30	0.58
LIOD1_9	300	2.97	1.31	0.63
OPM2_10	300	3.26	1.19	0.56
BI1_11	300	2.79	1.22	0.53
UA2_12	300	2.67	1.22	0.71
P2_13	300	3.40	1.04	0.55
LAA1_14	300	3.46	1.17	0.65
LSS1_15	300	2.27	1.06	0.54
LSS2_16	300	2.33	1.08	0.60
P3_17	300	3.15	1.09	0.59
LNF2_18	300	3.12	1.08	0.54
LAA2_19	300	2.96	1.20	0.71
SD2_20	300	3.02	1.22	0.62
LSS3_21	300	2.16	0.96	0.52
LP1_22	300	2.80	1.24	0.62
LNF3_23	300	2.49	1.05	0.56
LP2_24	300	3.62	1.15	0.67
OPM3_25	300	3.26	1.26	0.57

Table 1

Continued

Item	*N*	*Mean*	*SD*	*Corrected Item-Total Correlation*
LSS4_26	300	2.66	1.29	0.56
BI2_27	300	3.15	1.08	0.59
LIOD2_28	300	2.12	1.08	0.53
LNF4_29	300	2.91	1.04	0.62
SD3_30	300	2.55	1.16	0.65
LAA3_31	300	3.06	1.22	0.74
UF3_32	300	2.35	1.08	0.61
LP3_33	300	3.29	1.27	0.67
UA3_34	300	2.73	1.23	0.76
SD4_35	300	2.52	1.11	0.69
UA4_36	300	2.29	1.17	0.65
RI2_37	300	3.17	1.14	0.63
LIOD3_38	300	2.89	1.21	0.72
OPM4_39	300	2.69	1.25	0.59
RI3_40	300	3.04	1.07	0.69
LIOD4_41	300	2.39	1.08	0.64
LP4_42	300	3.16	1.25	0.69
P4_43	300	3.31	1.13	0.64
LP5_44	300	2.99	1.24	0.77
UF4_45	300	2.93	1.20	0.73
UA5_46	300	2.75	1.25	0.64
BI3_47	300	2.86	1.32	0.58
OPM5_48	300	2.60	1.20	0.58
RI4_49	300	3.38	1.13	0.68
BI4_50	300	3.06	1.18	0.73
OPM6_51	300	2.75	1.36	0.62

removed and the process was again repeated. The resulting seven-factor solution contained no items that cross-loaded on more than one factor and no items without a salient loading; however, several factors included items that did not match the content of the factor. These four items were thus removed and the final EFA was conducted. The final factor solution, presented in Table 2, contained seven factors that accounted for 73.19% of the variance. As seen in Table 3, inter-factor correlations in this seven-factor solution ranged from 0.35 to 0.66.

Within the seven-factor solution, three a priori domains each clustered together to form their own factors: (a) anxiety related to others' perceptions of me (relabeled as anxiety related to being perceived as weak), (b) anxiety related to experiencing pain, and (c) anxiety related to letting down important others. Four pairs of a priori domains clustered together to form the remaining four factors: (a) anxiety related to losing athletic ability and losing potential, (b) anxiety related to the loss of social support and experiencing social disconnect, (c) anxiety related to reinjury and having an uncertain future, and (d) anxiety related to having a negative body image and experiencing unpleasant affect. Respectively, these four factors were labeled (a) anxiety related to losing athleticism, (b) anxiety related to the loss of social support, (c) anxiety related to reinjury, and (d) anxiety associated with having an impaired self-image.

Table 2

Rotated Component Matrix for Seven-Factor Solution

	Component						
	1	2	3	4	5	6	7
LAA3_31	.76						
LAA2_19	.72						
LP5_44	.69						
LP1_22	.67						
LP3_33	.53						
OPM5_48		.82					
OPM4_39		.80					
OPM6_51		.77					
OPM1_8		.68					
P1_3			.83				
P3_17			.82				
P2_13			.82				
P4_43			.71				
LSS2_16				.82			
LSS1_15				.79			
LSS3_21				.79			
SD3_30				.53			
LIOD2_28					.74		
LIOD3_38					.72		
LIOD4_41					.71		
LIOD1_9					.68		
RI2_37						.85	
RI3_40						.82	
RI4_49						.67	
UF3_32						.56	
BI1_11							.81
BI3_47							.67
BI2_27							.65
UA2_12							.54
% Variance	42.73%	8.60%	5.57%	5.28%	4.05%	3.90%	3.48%
Eigenvalue	12.39	2.49	1.62	1.53	1.17	1.13	1.01
Alpha	.89	.90	.89	.87	.86	.87	.81

Table 3

Inter-Factor Correlations

	Factor						
	1	2	3	4	5	6	7
1. Losing Athleticism	1.0						
2. Being Perceived as Weak	0.52*	1.0					
3. Experiencing Pain	0.52*	0.37*	1.0				
4. Loss of Social Support	0.62*	0.63*	0.35*	1.0			
5. Letting Down Important Others	0.66*	0.63*	0.41*	0.62*	1.0		
6. Reinjury	0.64*	0.49*	0.55*	0.49*	0.57*	1.0	
7. Having an Impaired Self-Image	0.65*	0.51*	0.47*	0.57*	0.57*	0.56*	1.0

*$p < .01$

Reliability of the Instrument

The reliability of the overall scale and each of the seven subscales was assessed using Cronbach's (1951) alpha. The overall scale alpha was very high ($\alpha = .95$), indicating acceptable reliability (Nunnally & Bernstein, 1994). Subscale alphas were also considered very good, based on the criteria established by Nunnally (1978). Specifically, both the first factor (anxiety related to losing athleticism) and the third factor (anxiety related to experiencing pain) had an alpha value of .89. The second factor (anxiety related to being perceived as weak) had an alpha value of .90. Both the fourth factor (anxiety related to the loss of social support) and the sixth factor (anxiety related to reinjury) had an alpha value of .87. The fifth factor (anxiety related to letting down important others)

had an alpha value of .86. Finally, the seventh factor (anxiety associated with having an impaired self-image) had an alpha value of .81.

Descriptive Scale Statistics

Based on the seven-factor model, scores for the overall scale as well as for each subscale were calculated by summing the items for each scale and dividing by the total number of items on that scale. Table 4 presents a summary of descriptive statistics for the overall scale and for each subscale. Two scales (e.g., anxiety related to losing social support and anxiety related to experiencing pain) were significantly skewed (i.e., $z >$ 1.96). These scales were normalized using methods suggested by Tabachnick and Fidell (2001). However, these transformations did not substantially alter the shape of the curves. Thus, untransformed variables were employed to allow for easier interpretation of the data.

Three scales (anxiety related to losing athleticism, anxiety related to being perceived as weak, anxiety related to letting down important others) had significant kurtosis values (i.e., $z > 1.96$). This was judged not to be problematic as underestimates of variance associated with either positive or negative kurtosis disappear with a sufficiently large sample size (i.e., > 200; Tabachnick & Fidell, 2001). Thus, the overall scale and the seven subscales were left unaltered for further analyses.

Table 4

Descriptive Scale Statistics

Scale	*N*	*M*	*SD*	*Skewness (SE = .14)*	*Kurtosis (SE = .28)*	*Min*	*Max*	*α*
SIAS	300	2.83	0.76	-.17	-.31	1.00	4.76	.95
Anxiety Related to Losing Athleticism	300	3.02	1.02	-.16	-.78*	1.00	5.00	.89
Anxiety Related to Being Perceived As Weak	300	2.63	1.12	.26	-.90*	1.00	5.00	.90
Anxiety Related to Experiencing Pain	300	3.33	0.93	-.37*	-.11	1.00	5.00	.89
Anxiety Related to Loss of Social Support	300	2.34	0.88	.50*	.03	1.00	5.00	.87
Anxiety Related to Letting Down Important Others	300	2.53	0.96	.27	-.68*	1.00	4.80	.86
Anxiety Related to Reinjury	300	2.98	0.94	-.26	-.35	1.00	5.00	.87
Anxiety Associated with Having an Impaired Self-Image	300	2.87	0.97	.07	-.44	1.00	5.00	.81

*$p < .05$

Examining Differences Among Groups

Several independent groups *t*-tests and one-way ANOVAs were conducted to analyze differences on the overall scale and subscales between various groups. There were no significant differences found on the overall scale or any of the subscales between individuals differing in ethnicity, year in school, region of the country, division of competition, status on the team (as either a starter, "Top 5" member, or varsity athlete), when the most recent injury occurred, or how recently the athlete returned from the most recent injury.

Significant differences were found for several other variables. Due, however, to the high number of statistical comparisons made ($n = 11$), the Bonferroni adjustment was employed (Thomas & Nelson, 2001) and the alpha level was adjusted to $p < .005$. The variables of sport, whether or not the athlete had ever been to a sport psychology consultant, and whether or not the athlete had ever been to a counselor failed to show significant differences. However, there were significant differences for gender, injury support group, surgery, type of injury. time loss due to injury, perceived severity of the most recent injury, number of injuries, and risk for injury. Each of these differences is discussed in the following sections.

Gender. Significant differences were found between male and female participants on the overall scale and on four of the seven subscales. An independent samples *t*-test indicated that, for the overall scale, the females' scores were significantly higher than the males' scores (t [298] = -3.21, p = .001). The same trend followed for anxiety related to being perceived as weak (t [298] = -3.33, p = .001), anxiety related to experiencing pain (t [298] = -3.88, $p < .001$), anxiety related to reinjury (t [298] = -3.92, $p < .001$), and anxiety associated with having an impaired self-image (t [298] = -2.86, p = .005). Table 5 presents the mean differences between male and female participants on each of these scales.

Table 5

Significant Gender Differences

Scale	*Gender*	*N*	*Mean*	*SD*	*Mean Difference*
SIAS	Female	165	2.95	0.76	0.27
	Male	135	2.68	0.74	
Anxiety Related to Being Perceived as Weak	Female	165	2.82	1.15	0.42
	Male	135	2.40	1.03	
Anxiety Related to Experiencing Pain	Female	165	3.51	0.90	0.40
	Male	135	3.11	0.91	
Anxiety Related to Reinjury	Female	165	3.17	0.89	0.42
	Male	135	2.75	0.95	
Anxiety Associated with Having an Impaired Self-Image	Female	165	3.01	1.00	0.32
	Male	135	2.69	0.91	

Injury Support Group. An independent samples *t*-test indicated a significant difference for anxiety related to reinjury between athletes who had participated in an injury support group and those who had not (t [298] = -2.95, $p < .005$). Specifically, athletes who had participated in an injury support group scored significantly lower (N = 12, M = 2.21, SD = 0.80) than those athletes who had not participated in an injury support group (N = 288, M = 3.01, SD = 0.93).

Surgery. An independent samples *t*-test indicated a significant difference for anxiety related to the loss of social support between athletes who had surgery for their most recent injuries and athletes who did not (t [213] = 2.82, $p = .005$). Specifically, athletes whose most recent injuries required surgery scored significantly higher (N = 36, M = 2.70, SD = 0.96) than athletes whose most recent injuries did not require surgery (N = 179, M = 2.24, SD = 0.87).

Type of Injury. An independent samples *t*-test indicated a significant difference for anxiety related to experiencing pain between athletes whose most recent injury was a chronic injury and athletes whose most recent injury was an acute injury (t [213] = 4.32, $p < .001$). Specifically, athletes whose most recent injury was a chronic injury (N = 71, M = 3.82, SD = 0.92) scored significantly higher than athletes whose most recent injury was an acute injury (N = 144, M = 3.26, SD = 0.90).

Time Loss Due to Injury. A one-way ANOVA revealed significant differences on three subscales among athletes who were unable to participate in their sports due to their most recent injuries for various amounts of time. Specifically, athletes' scores were significantly different on the anxiety related to loss of athleticism (F [5, 209] = 3.92, $p < .005$), anxiety related to the loss of social support (F [5, 209] = 7.51, $p < .001$), and

anxiety associated with having an impaired self-image (F [5, 209] = 3.91, $p < .005$). However, a Tukey post hoc test revealed no significant differences between any of the groups for anxiety associated with having an impaired self-image.

For anxiety related to the loss of athleticism, the Tukey post hoc test revealed significant differences ($p < .005$) between athletes whose most recent injuries kept them from participating in their sports for less than two weeks and athletes whose most recent injuries kept them from participating in their sports for longer than one year. Specifically, athletes whose most recent injuries kept them from participating in their sports for less than two weeks (N = 94, M = 2.82, SD = 1.03) scored significantly lower than athletes whose most recent injuries kept from participating in their sports for over one year (N = 7, M = 4.34, SD = 0.81).

For anxiety related to the loss of social support, the Tukey post hoc test revealed significant differences between athletes whose most recent injuries kept them from participating in their sports for at least one year and athletes whose most recent injuries kept them from participating in their sports for either less than two weeks, between two weeks to one month, or between one and three months (all ps < .001). Specifically, athletes whose most recent injuries kept them from participating in their sports for more than one year (N = 7, M = 3.86, SD = 1.21) scored significantly higher than athletes whose most recent injuries kept them from participating in their sports for less than two weeks (N = 94, M = 2.08, SD = 0.79), for between two weeks and one month (N = 51, M = 2.35, SD = 0.86), and for between one and three months (N = 27, M = 2.27, SD = 0.80).

Perceived Severity of the Most Recent Injury. A one-way ANOVA indicated significant differences on the overall scale (F [4, 210] = 4.02, $p < .005$) and on three of

the subscales based on the perceived severity of athletes' most recent injuries. Specifically, athletes' scores were significantly different on the anxiety related to experiencing pain (F [4, 210] = 4.49, $p < .005$), anxiety related to the loss of social support (F [4, 210] = 5.07, $p = .001$), and anxiety related to reinjury (F [4, 210] = 3.94, $p < .005$). However, the Tukey post hoc test revealed no significant differences between any of the groups for the overall scale, anxiety related to experiencing pain, and anxiety related to reinjury.

For anxiety related to the loss of social support, the Tukey post hoc test revealed significant differences between athletes who perceived their most recent injuries to be *extremely severe* and those who perceived their most recent injuries to be either *not very severe* or *not severe at all (p*s = .001). Specifically, athletes who perceived their most recent injuries to be *extremely severe* ($N = 20$, $M = 3.02$, $SD = 1.24$) scored significantly higher than athletes who perceived their most recent injuries to be either *not very severe* ($N = 56$, $M = 2.15$, $SD = 0.85$) or *not severe at all* ($N = 21$, $M = 1.95$, $SD = 0.81$).

Number of Injuries. Athletes were divided into groups based on the number of previous injuries they had incurred. The first group was comprised of athletes with no previous injuries. The second group was comprised of athletes with only one or two previous injuries, and the third group was comprised of athletes with more than two previous injuries. A one-way ANOVA indicated significant differences (F [2, 297] = 6.28, $p < .005$) on anxiety related to experiencing pain. A Tukey post hoc test revealed a significant difference ($p < .005$) between athletes with three or more previous injuries and athletes with no previous injuries. Specifically, athletes who had at least three previous

injuries (N = 79, M = 3.52, SD = 0.92) scored significantly higher than athletes with no previous injuries (N = 85, M = 3.04, SD = 0.81).

Risk for Injury. Risk for injury was determined by examining the average rate of injuries with time loss per 1000 exposures (i.e., opportunities for injury), as established by Powell and Dompier (2004). One group consisted of participants in low-risk sports (i.e., had < 3.8 time loss injuries per 1000 exposures). These athletes participated in baseball, cross-country/track and field, golf, swimming and diving, and tennis. The second group consisted of participants who participated in moderate-risk sports (i.e., had between 4.0 and 6.1 time loss injuries per 1000 exposures). These participants competed in basketball, field hockey, softball, and volleyball. The final group consisted of participants who participated in high-risk sports (i.e., had > 7.0 time loss injuries per 1000 exposures). These athletes competed in football, soccer, and wrestling. It should be noted that Powell and Dompier did not provide injury data for cheering, gymnastics, lacrosse, or sailing; thus, participants in these sports were not included in these analyses.

A one-way ANOVA indicated a significant group difference on anxiety related to experiencing pain among athletes varying in their sport's level of risk (F [2, 279] = 7.33, p = .001) and a Tukey post hoc test revealed a significant difference (p = .001) between athletes competing in the moderate-risk sports and those competing in the low-risk sports. Specifically, athletes who competed in the moderate-risk sports (N = 74, M = 3.67, SD = 0.78) scored significantly higher than athletes competing in the low-risk sports (N = 127, M = 3.19, SD = 0.96). Interestingly, athletes who competed in moderate-risk sports also scored higher on anxiety related to experiencing pain than athletes who participated in the

high-risk sports (N = 81, M = 3.22, SD = 0.89), although the difference was not quite significant (p = .006).

Discussion

The purpose of this dissertation was to develop a theoretically-based and psychometrically reliable instrument that would allow an accurate assessment of the incidence and magnitude of sport injury anxiety. Three hundred student-athletes from various ethnicities, schools, sports, and levels of competition completed the questionnaire. Data from these respondents were used to assess the factorial validity and internal reliability of the SIAS. Additionally, these data were used to examine differences among various groups of student-athletes

Factor Analysis

Results of the factor analysis provided support for the construct validity of the items designed to assess beliefs that aversive consequences follow injury. Seven interpretable factors emerged from the EFA: (a) anxiety related to losing athleticism, (b) anxiety related to being perceived as weak, (c) anxiety related to experiencing pain, (d) anxiety related to the loss of social support, (e) anxiety related to reinjury, (f) anxiety related to letting down important others, and (g) anxiety associated with having an impaired self-image. These factors are conceptually similar to those identified in previous qualitative research (e.g., Chan & Grossman, 1988; Gayman & Crossman, 2003; Heil, 2000; Leddy et al., 1994; A. M. Smith et al., 1993; Taylor, 1997; Tracey, 2003; Udry, Gould, Bridges, & Beck, 1997; Udry, Gould, Bridges, & Tuffey, 1997; Weiss & Troxel, 1986). Although the present factor analysis provided no new information regarding the

possible components of injury anxiety, the SIAS represents the first attempt to quantitatively assess the intensity of each of these components.

Reliability

The alpha value achieved by the SIAS suggests a very high level of reliability, in light of the criteria established by Nunnally and Bernstein (1994). Remarkably, the alpha value remained almost equal to the initial value of .96 even after it was reduced by almost half the number of items. The alpha levels for each of the seven subscales were also very good and far exceeded the recommended level of .70 established by Nunnally (1978). These high alpha values suggest that the overall scale and the seven subscales can be shortened (DeVellis, 1991) without sacrificing reliability of the instrument. A confirmatory factor analysis is necessary, however, to determine whether any more items can be deleted from the scale.

Descriptive Scale Statistics

The overall scale and subscales all appear to be adequate for use in future research. Specifically, all scales have means sufficiently close to the center of the scale, indicating that they are able to detect values within the full range of the construct (DeVellis, 1991). Each scale also has an adequately high variance, indicating that scores for each scale are diverse. Finally, all seven subscales have a range that includes both the minimum and maximum possible scores, further supporting the notion that these scales are capable of representing a wide range of injury anxiety intensities. Although the range for the overall scale does not include the maximum possible score of 5.0, the maximum

recorded score of 4.76 is sufficiently close to the possible maximum score to alleviate most concerns.

Based on the reported scores on the overall scale and each of the subscales, it appears that, in general, the collegiate athletes in this study did not experience high levels of sport injury anxiety. Anxiety related to experiencing pain seemed to be the most salient component of sport injury anxiety for these athletes, followed by anxiety related to losing athleticism and anxiety related to reinjury. That these three components of sport injury anxiety demonstrated the highest intensities among the participants is not surprising. At the most superficial level injury is a physical problem, and these three components are associated with the physical consequences of injury. Even if an injured athlete's social support network and psychological well-being remain unscathed following injury, the likelihood that the athlete does not experience at least one of these three aversive physical consequences of injury is small. Thus, it is not surprising that an injured athlete would experience anxiety related to an aversive physical consequence of injury with greater intensity than s/he would one of the other aversive consequences.

One other aspect of the factor solution that warrants discussion is the degree to which the subscales correlated with each other. The inter-factor correlations ranged from 0.35 to 0.66. These moderate correlations (i.e., < 0.80) indicate that the subscales are positively related to one another but are not identical (Maruyama, 1998, p. 64). Thus, one important area for future research would be to determine what, if any, unique correlates exist for each subscale.

Differences Among Groups

Although it was not a primary purpose of this study, the comparisons between various groups of athletes yielded several interesting findings. Given the large sample size and the wide variety of demographic characteristics among the participants, it is likely that these results are relatively generalizable across student-athletes.

Gender. Compared to their male counterparts, female athletes scored significantly higher on the overall sport injury anxiety scale, anxiety related to being perceived as weak, anxiety related to experiencing pain, anxiety related to reinjury, and anxiety associated with having an impaired self-image. These differences may have emerged for several reasons. First, women tend to report higher levels of anxiety than men in general (Brawman-Mintzer & Lydiard, 1996). Thus, female athletes may also tend to report higher levels of situation-specific forms of anxiety. For example, Storch, Storch, Killiany, and Roberti (2005) found that female athletes reported having significantly higher levels of social anxiety than either male athletes or male and female non-athletes. Given that situation-specific forms of anxiety are related to general trait anxiety as well as to each other (Landers & Arent, 2001), it is not surprising that the female athletes in the present study scored higher on several of the scales than their male counterparts.

That female athletes reported higher levels of anxiety associated with having an impaired self-image is not startling. Female athletes must often confront many issues that male athletes do not. According to Coakley (2004), female athletes are commonly faced with criticism from people who "resent changes favoring strong women" (p. 246), with cultural messages that emphasize "cosmetic fitness," and with the threat of being labeled

"lesbian." With female athletes' (but not males') identities being regularly critiqued and questioned by others, it seems possible that the females may internalize these negative evaluations and begin to doubt themselves.

Injury Support Groups. Athletes who participated in an injury support group scored significantly lower on anxiety related to reinjury than did athletes who had not participated in an injury support group. In addition to this finding, it is also important to note that athletes who participated in an injury support group scored lower (although not quite significantly) on the overall sport injury anxiety scale, anxiety related to the loss of athleticism, and anxiety related to the loss of social support. These findings suggest the potential importance of injury support groups for injured athletes. Although the link has not yet been established between injury anxiety (i.e., scores on the SIAS) and injury incidence, if this relationship follows the same general pattern that has been found for other sport-specific measures of anxiety and injury incidence (Blackwell & McCullagh, 1990; Hanson et al., 1992; Passer & Seese, 1983; Petrie, 1993), then those athletes who participate in injury support groups may be at less risk of becoming reinjured upon their return to participation than athletes who do not participate in such groups.

Surgery. Athletes whose injuries required surgery scored significantly higher on anxiety related to the loss of social support than athletes whose injuries did not require surgery. This finding is not unexpected; athletes who undergo surgery must also spend a considerable amount of time in rehabilitation. The time spent in rehabilitation often takes place during regularly scheduled team practices. Thus, athletes recovering from surgery are less frequently around their teammates and coaches.

A second reason why athletes who undergo surgery may feel less social support may be that injured athletes pose a threat to the unity of the team (Scarry, 1985). Specifically, the injured player tears at the team's "ideal of feeling intimately connected to each other" because s/he is "unable to 'realize' the team, that is, make the team seem real, by either participating in the rituals that make the team visible or responding to the rhythms and habits that make the team feel natural" (Pillsbury, 1996, p. 44). The injured athlete's inability to maintain an effective role in the unification of the team pushes him or her to the sidelines, literally and figuratively, thus forcing a mutual withdrawal of the athlete away from the team and the team away from the athlete.

Injured athletes may also become segregated from the team because they force other athletes to consider their own mortality and weakness. An injured athlete's sole focus on his or her acute pain "ripples throughout the team as an awareness of the team's fragility and the possibility of their own withdrawal" (Pillsbury, 1996, p. 45). Athletes who have undergone surgery may serve as acute reminders to their teammates that, at any time, any athlete may become injured. Scarry (1985) asserts that when teammates begin to consider their own fragility in this way team unity suffers; therefore, some teammates and coaches may temporarily distance themselves from the injured athlete to maintain the team's harmony.

Type of Injury. Athletes whose most recent injuries were chronic reported higher levels of anxiety related to experiencing pain than athletes whose most recent injuries were acute. This finding may be related to the concept of hope. Increased levels of hope are associated with more positive attitudes, decreased levels of depression, increased feelings of self-worth, better coping skills, and an increased tolerance of pain during the

rehabilitation process (Collins & Kuehn, 2004). It is possible that athletes who suffer acute injuries may have higher levels of hope that their pain will be short-lived and that there is a healthy future in sight. Athletes who suffer from chronic injuries may be less hopeful that they will be healthy in the future. Similar to the development of learned helplessness, athletes with chronic injuries may begin to believe that they have no control over whether their injuries will heal completely or not, thus losing hope for the future. Although no research has examined the relationship between hope and different types of injuries, this is a promising area of future inquiry.

Time Loss Due to Injury. Athletes who were unable to participate in their sports due to injury for over a year scored significantly higher on anxiety related to the loss of athleticism and anxiety related to the loss of social support than athletes who were unable to participate in their sports for substantially shorter periods of time. That athletes who were unable to participate in their sports for longer than a year were concerned with losing their athleticism is not surprising. Muscles and skills both tend to deteriorate if they are not used for prolonged periods of time. Although musculature can be restrengthened, the time for improvement cannot be regained. As made clear by one participant in the pilot interview study (Cassidy & Morgan, 2005), it is unclear to injured athletes how successful they would have become had they not been injured and lost the time needed to recover. This may serve as a nagging thought to the previously-injured athlete that potentially directs attention away from relevant cues and diminishes performance. The anxiety related to the loss of social support accompanying prolonged periods of rehabilitation can also be explained in terms of Pillsbury's (1996) and Scarry's (1985) assertions that injured athletes diminish team unity.

Number of Previous Injuries. Collegiate athletes who had suffered at least three previous injuries scored significantly higher on anxiety related to experiencing pain than athletes with no previous injuries. Not surprisingly, the previously injured athletes also scored higher (although not significantly) on anxiety related to reinjury than the athletes with no previous injuries. These results are expected given that it is difficult for athletes to understand the pain associated with injury unless they have had previous experience of actually being injured. According to Lazarus's (1991a, 1991b, 1991c, 1999, 2000) cognitive-motivational-relational theory of emotion, to experience anxiety, individuals first must perceive a relevant change in the environment and then appraise the change as a threat. It seems plausible that athletes who have never experienced the pain associated with injury might not appraise that experience to be as threatening to their goals as athletes who have had many experiences with injury-related pain. Thus, without fully understanding the pain of being injured it is unlikely that an athlete would have a high level of anxiety related to experiencing pain.

Risk for Injury. Athletes who competed in sports with a moderate risk for injury reported significantly more anxiety related to experiencing pain than athletes who competed in sports with a low risk for injury. The same explanation for why previously-injured athletes reported more anxiety related to experiencing pain than athletes with no previous injuries can also be employed to explain the difference between athletes competing in sports with a moderate versus low risk for injury. Specifically, those athletes who compete in low-risk sports are less likely to have been injured in the past and thus may not have as great an understanding of what it means to be injured as athletes competing in moderate-risk sports.

Interestingly, athletes competing in moderate-risk sports reported more (although not quite significantly) anxiety related to experiencing pain than athletes in high-risk sports. Athletes, especially male athletes in high-risk sports such as football, soccer, and wrestling (Coakley, 2004), commonly face "normal" experiences that include "arthritis, concussions, bone fractures, torn ligaments, partial blindness, partial and full paralysis, and even death" (Coakley, 2004, p. 214). The risks that these athletes take are often equated with their masculinity; the greater the risks taken, the more manly the athlete (Waddington, 2000). "When the give-and-take of violence [in sport] leads to injury and pain, some men learn to 'suck it up' and stay in the game – partly because of what it means to be an athlete and partly because of what it means to be a man in their social world" (Coakley, p. 214). This deviant overconformity to the belief that "real" athletes accept risks and play through pain has extended into the world of women's sport as well.

With the likelihood of becoming injured greater in high-risk sports (e.g., football, soccer, wrestling), it is possible that athletes who compete in these sports expect to become injured at some point in their collegiate careers. The core relational theme for anxiety is facing an "uncertain, existential threat" (Lazarus, 1991a, p. 235). When the uncertainty of becoming injured and experiencing pain is diminished, at least to some degree, it is likely the anxiety related to becoming injured and experiencing pain is also diminished. This may explain why the athletes participating in moderate-risk sports, who have less of an expectation of becoming injured and experiencing pain, reported more anxiety related to experiencing pain than the athletes in high-risk sports who perhaps expect to encounter these experiences at some time.

Practical Implications

The results of this study have several practical implications for sport psychology consultants, coaches, and athletic trainers. First of all, special attention should be given to any athletes who are more likely to experience one or more sources of injury anxiety when they become injured. Coaches and athletic trainers should make a point to observe these athletes and note any mood disturbances or other negative changes that surface when an injury occurs. If it is determined that an athlete is unable to cope with his or her injury, then coaches and athletic trainers should refer the athlete to a sport psychology consultant who can assist the athlete.

To help athletes alleviate general sport injury anxiety, anxiety related to experiencing pain, and anxiety related to reinjury, sport psychology consultants could teach athletes relaxation skills and cognitive restructuring techniques and urge them to practice these skills/techniques on a regular basis. Sport psychology consultants could also work with athletes to help them structure precompetitive game plans that include the use of focus cues that orient the athletes' thinking towards the process of their performance when they resume participation rather than toward the threat of reinjury.

To assist athletes who are struggling with anxiety related to the loss of athleticism, athletic trainers could make attempts to provide these injured athletes with physical exercises that can help them maintain some level of fitness during recovery without interfering with the rehabilitation process. For instance, an athlete with an injury to the lower body could be prescribed a workout regimen that includes several hours per week of continuous upper body activity (e.g., on an arm bike) to maintain cardiovascular fitness. In addition, coaches could give injured athletes the opportunity to continue to

practice any skills that do not interfere with recovery. For example, a volleyball player with a lower body injury could practice her setting skills by sitting down and setting against a wall. Modifications that allow injured athletes to continue to participate in skill exercises may prove very beneficial to the athletes' psychological well-being.

To help prevent athletes from developing anxiety related to being perceived as weak, athletic trainers could meet with coaches and teammates of injured athletes to educate them about the injury. By helping coaches and teammates achieve an understanding of exactly what the injury is and what the rehabilitation process will involve, athletic trainers can diminish the possible perception that injured athletes are being lazy or are mentally weak.

To reduce injured athletes' levels of anxiety related to the loss of social support and to letting down important others, sport psychology consultants could hold pre-season workshops for teams and their family members to discuss the importance of having a solid social support network in place should an athlete become injured. If coaches, teammates, and family members are aware of the positive impact that social support can have on an injured athlete's psychological well-being they may be more likely to provide that support if and when an athlete becomes injured. Also, based on the findings from this study, participating in an injury support group seems to alleviate some of the anxiety related to the loss of social support that injured athletes experience. Thus, sport psychology consultants could facilitate the creation of injury support groups in addition to serving as sources of social support themselves for athletes who become injured.

Based on both the results of this study and previous findings indicating that female athletes are more likely than male athletes to meet the requirements of having a

clinical eating disorder (Sanford-Martens, Davidson, Yakushko, Martens, Hinton, & Beck, 2005), it would appear sensible for coaches, athletics trainers, and sport psychology consultants to maintain a watchful eye on injured female athletes. Although it is unknown whether an injured female athlete who possesses high anxiety associated with having an impaired self-image would be more likely to develop disordered eating habits than one who does not, precautions should be taken to guard against this potentially destructive behavior.

V. Summary, Conclusions and Recommendations

Summary

The primary purpose of the present research was to develop a theoretically-based and psychometrically reliable instrument to measure the incidence and magnitude of sport injury anxiety. Despite the fact that sport psychology researchers have recognized the need to develop instruments measuring different components of sport anxiety, including sport injury anxiety (Hanson et al., 1992; Martens et al., 1990), no theoretically-based measure of sport injury anxiety had been developed prior to this research.

The current study utilized exploratory factor analysis to develop a preliminary measure of athletes' sport injury anxiety. The resulting factor solution comprised seven components of sport injury anxiety: (a) anxiety related to losing athleticism, (b) anxiety related to being perceived as weak, (c) anxiety related to experiencing pain, (d) anxiety related to the loss of social support, (e) anxiety related to reinjury, (f) anxiety related to letting down important others, and (g) anxiety associated with having an impaired self-image. These components were theoretically similar to the aversive consequences of injury that had previously been identified in existing literature.

Overall, there was only a moderate number of significant differences on the overall sport injury anxiety scale and each of the subscales; however, some of the subscales, such as anxiety related to reinjury and anxiety related to the loss of athleticism approached significance between groups on all or nearly all of the variables examined.

The development of the SIAS may evoke a substantial shift in the way in which sport psychology researchers and consultants view the anxiety-injury relationship.

Specifically, it may be that only one component of sport injury anxiety, rather than general sport injury anxiety, is significantly related to injury incidence. Additionally, the SIAS may serve to guide practitioners' interactions with currently or previously injured athletes, particularly in light of the finding that certain types of injuries (e.g., chronic, severe, those requiring surgery) lead to significantly higher levels of sport injury anxiety. Future research is necessary, however, to gain a full understanding of the implications of sport injury anxiety on athletes' risk of injury.

Conclusions

Based on the results of the present study, two conclusions can be made. First, the SIAS and each of the seven subscales demonstrated high levels of reliability. The emergence of seven factors on the SIAS highlight the multidimensional nature of sport injury anxiety. Thus, athletes' sport injury anxiety may not be manifested as a general form of anxiety related to injury; rather, athletes may exhibit symptoms of anxiety related to one (or more), but not all, of the facets of sport injury anxiety.

Second, the SIAS marks an attempt to address the limitations of previous measures of sport injury anxiety. Specifically, as opposed to the TSK (Miller et al., 1991) and the measure developed by Kontos et al. (2000), the SIAS was tested on and developed for use with competitive collegiate athletes. Additionally, in contrast to Kleinert's (2002) SITAS, the SIAS is a theoretically-based instrument with acceptable face validity. Thus, it appears that the SIAS provides the most suitable measure of sport injury anxiety for use with collegiate athletic populations.

Recommendations

Based on the findings of the current research several recommendations are offered for future researchers. First, a confirmatory factor analysis should be conducted to validate the proposed factor structure of the SIAS. This analysis might also allow for a reduction in the length of the SIAS from 29 items to a more manageable number. Once the factor structure of the SIAS has been confirmed, the correlates of sport injury anxiety and its components should be examined. Specifically, the relationship of scores on the SIAS to measures of general sport anxiety, positive and negative affect, sport confidence, depression, and other sport-related phenomena should be explored. It may also prove insightful to examine the relationship between scores on the SIAS and measures of social desirability.

With a greater understanding of sport injury anxiety established, researchers can begin reexamining the relationship between sport injury anxiety and injury incidence. A prospective methodological design might involve participants completing the SIAS prior to the start of an athletic season and then keeping records of their injury status throughout the season. If the SIAS is truly a valid measure of sport injury anxiety and the stress-injury model (Andersen & Williams, 1988) is accurate, it may be that individuals who score high on the SIAS before the season experience either more time loss due to injury or more significant injuries throughout the season. Should this be the case, the next step in this line of research might involve the development of prevention or intervention strategies.

Several types of intervention studies could be conducted. First, interventions designed for use with athletes who are not injured but may be at a high risk for injury

(based on their scores on the SIAS) might be performed in an effort to reduce those athletes' risk of becoming injured. The data from the present study suggest that injury support groups are one effective means of reducing injured athletes' levels of anxiety related to reinjury. Thus, a second type of intervention might target ways of reducing the negative impact that the current injuries have on athletes' future levels of sport injury anxiety. Finally, interventions designed to enhance coaches' and teammates' levels of understanding about the negative ramifications of injury on injured athletes could be conducted. This type of intervention may be effective in reducing injured athletes' levels of anxiety related to the loss of social support and anxiety related to being perceived as weak. Thorough documentation of prospective interventions should allow for the replication of studies with various groups of athletes and, eventually, the establishment of standards concerning what does and does not work in various settings.

Although it is not possible to prevent all future injuries or ensure that no injured athletes are negatively impacted by their injuries, I strongly believe that any reduction in either the number of injuries incurred by athletes or the negative impact that injuries can have on athletes, no matter how small, makes this research worthwhile. It is my sincere hope that in my career as a sport psychology professional I will be able to positively impact at least one athlete and enhance his or her life.

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Appendices

Appendix A: Expanded Review of Literature

In this section, an expanded review of the literature regarding anxiety is presented. The major topics include: (a) cognitive appraisal models of anxiety, (b) current definitions of sport injury anxiety, (c) the conceptualization of sport performance anxiety (R. E. Smith & Smoll, 1990), (d) a new conceptualization of sport injury anxiety, (e) measurement of general and sport-specific anxiety, (f) limitations of existing measures of injury anxiety/fear of injury, and (g) discussion of a new measure of sport injury anxiety.

Cognitive Appraisal Models

Within the field of sport psychology, cognitive appraisal models are commonly used to explain the process of anxiety, especially as it relates to injury. The two most prominent models are Lazarus's cognitive-motivational-relational theory of emotion (1991a, 1991b, 1991c, 1999, 2000) and the injury-specific model of response to injury developed by Wiese-Bjornstal et al. (1998). The basic premise of cognitive appraisal models is that injury is a stressor (Brewer, 1994). In these models, an athlete's appraisal of what it means to be injured, coupled with personal and situational factors, results in an emotional response, which in turn leads to a behavioral response. "Thus, the fact that injury has *occurred* is considered less critical to understanding emotional reactions than is the way in which the injury is *perceived*" (Brewer, p. 90, italics in original).

Lazarus's (1991a, 1991b, 1991c, 1999, 2000) cognitive-motivational-relational theory (CMRT) states that a comprehensive theory of emotion must include cognitive, motivational, and relational components. The cognitive component refers to the knowledge and appraisal of what is happening in adaptational encounters (Lazarus & Smith, 1988) and occurs when an individual perceives a change in the environment and

assesses the situation. The motivational component deals with acute emotions that occur as a result of the status of goals. For an individual to experience an emotion, an important goal must be at stake. The relational component deals with some transaction, either real or imaginary, that occurs between an individual and the environment where something important is at stake.

Central to the CMRT of emotion is the idea that each emotion can be summarized by a core relational theme. These themes are consistent across individuals, eras, and situations. The core relational theme for anxiety is the prospect of facing an uncertain, existential threat. To experience anxiety, individuals must first perceive a relevant change in the environment and then appraise the change as a threat. Lazarus also believes that each emotion, as defined by its core relational theme and pattern of appraisal, involves its own innate action tendency. For anxiety, the action tendency is an avoidance behavior.

Currently, the most utilized injury-specific model of response to injury is the one developed by Wiese-Bjornstal et al. (1998). This model is an adaptation of the original integrated model depicting the psychological response to sport injury first proposed by Wiese-Bjornstal, Smith, and LaMott (1995). The model suggests that pre-injury factors, such as personality, history of stressors, coping resources, and interventions (Andersen & Williams, 1988), and post-injury factors, such as personal factors and situational factors (Wiese-Bjornstal et al., 1995), influence the psychological response to injury.

Personal Factors. Among the personal factors that are proposed to be related to athletes' responses to sport injury are injury history, severity of the injury, type of injury, perceived cause of the injury, and recovery status. A. M. Smith et al. (1993) found that injury severity was the most significant predictor of post-injury depression.

Support for the relationship between recovery status and emotional response to injury was obtained by Leddy et al. (1994) who found that injured athletes experienced greater mood disturbance during the initial phase of the injury than they did after they had recovered from the injury. Udry (1997) and Heil (1993) voiced support for these results and suggested that early post-injury access to injured athletes is ideal in examining the psychological responses of athletes to injury because emotionality is greatest at this time.

Psychological investment in sport has been one of the psychological variables related to athletes' responses to injury examined by researchers. For example, Kleiber and Brock (1992) found that collegiate athletes who experienced a career-ending sport injury and who had previously been invested in playing professional sport experienced lower self-esteem and life satisfaction than injured athletes who were not psychologically invested in playing their sport professionally.

Situational Factors. Among the situational variables that have been proposed to be related to athletes' responses to sport injury are: time during the season that the injury occurs, level of participation, teammate and coach influence, social support provision, and rehabilitation environment. In a qualitative investigation, Gayman and Crossman (2003) explored athletes' emotional response to the injury depending on the timing of the injury. In this study, 20 recreational and collegiate-level athletes were interviewed to determine how they thought they would react if they became injured at various points throughout the season. Results indicated that if the athletes were injured during preseason they would feel frustrated and upset and might also worry about letting their teams down and losing the opportunity to improve. At midseason, they would be concerned with

losing their starting role, becoming socially disconnected from their teams, and losing the opportunity to improve. At the end of the season, participants indicated that they might be worried about letting their team down during the critical time of play-offs. Finally, athletes indicated that if they were to become injured during the post-season, they might experience decreased feelings of self-worth as well as the continuing concern about letting their teams down. Although the participants in this study indicated that they might experience the same emotions throughout the season, there did appear to be differences in particular emotions at varying time points at which the injury occurred.

Another situational factor that has received some scholarly attention has been that of social support. Specifically, Green and Weinberg (2001) found that injured athletes' satisfaction with their social support network was significantly related to mood disturbance in that increased satisfaction led to lower levels of mood disturbance.

Current Definitions of Sport Injury Anxiety

The phrase "fear of injury" is commonly mentioned in the sport psychology literature but often goes undefined (Kleinert, 2002). In other cases it is only vaguely defined. For instance, Dunn et al. (1999) defined fear of injury as a state "in which the athlete's primary concern focuses upon competitive factors that are strongly related to the possibility of getting hurt or injured" (p. 23). A more specific definition can be found in the medical literature, where fear of injury is conceptualized as "a condition in which the patient has an excessive, irrational, and debilitating fear of physical movement and activity, resulting in feelings of vulnerability to painful injury or reinjury" (Reneman et al., 2003, p. 278). Although definitions of fear of injury are limited in the sport

psychology literature, definitions of anxiety are more prevalent. Assuming that fear of injury and injury anxiety may be related constructs, an examination of sport anxiety research would appear fruitful. More specifically, R. E. Smith and Smoll's (1990) conceptualization of sport performance anxiety appears to offer a good model for the conceptualization of sport injury anxiety.

Sport Performance Anxiety

According to R. E. Smith and Smoll (1990), sport performance anxiety (SPA) can be defined as "a learned tendency to respond with cognitive and/or somatic state anxiety to competitive sport situations in which the adequacy of the athlete's performance can be evaluated" (p. 421). R. E. Smith and Smoll proposed their model of SPA based on other models of emotion and anxiety (e.g., Lazarus & Folkman, 1984; Spielberger, 1966). In the SPA model, the intensity and duration of the SPA response are presumed to be influenced by the nature of the competitive sport situation (e.g., strength of opponent, importance of contest, presence of significant others), the athlete's cognitive and somatic sport-specific trait anxiety, and the individual's defensive operations. "These defensive processes operate at the level of appraisal and in some way modify or distort the perception or appraisal of the situation" (R. E. Smith & Smoll, p. 421). If the defensive processes allow the individual to cope successfully with the situation, then that situation will appear less threatening; if not the situation will appear more threatening.

In the conceptual model of SPA, the sport situation, levels of trait anxiety, and defensive operations are all believed to influence the performer's appraisals (R. E. Smith & Smoll, 1990). Four appraisals are especially significant: the appraisal of the situational

demands, the appraisal of the individual's resources to deal with the situational demands, the appraisal of the nature and likelihood of potential consequences if the situational demands are not met, and the appraisal of what those consequences mean to that individual. According to R. E. Smith and Smoll, an individual is likely to experience SPA if the following four appraisals are made: (a) the individual believes that the present situation is overwhelming, (b) that s/he has insufficient resources available to successfully deal with the situation, (c) that failure or disapproval from others is imminent, and (d) that his or her self-worth will diminish as a result of the failure. Appraisals such as these are likely to produce high levels of physiological arousal that in turn breed even more negative appraisals.

The next step in this model involves the link between SPA and the resulting cognitive, physiological, and behavioral responses (R. E. Smith & Smoll, 1990). In the event that the individual makes positive appraisals of the situation, s/he is likely to experience task-relevant responses that facilitate performance. Conversely, an individual who makes negative appraisals may experience task-irrelevant responses that may have a debilitative effect on performance. These debilitative responses may include the inability to concentrate on the task at hand (cognitive response), levels of arousal that are not suitable to the task (physiological response), and impulsive or inappropriate behaviors for the task (behavioral).

Sport Injury Anxiety

Based on modifications of the definition of SPA presented by R. E. Smith and Smoll (1990), sport injury anxiety can be defined as *the tendency to respond with*

cognitive or somatic anxiety in sport situations where injury is seen as possible and/or likely. In addition, the intensity and duration of the injury anxiety response would be influenced by factors similar to those associated with SPA. Rather than focusing on the nature of the competitive sport situation, an athlete who experiences sport injury anxiety may be influenced by his or her injury history, the severity of the previous injury, the amount of time that has elapsed since return to sport, and a variety of other injury-related factors.

As with SPA, it is assumed that there are a set of appraisals that an athlete must make for injury anxiety to occur. First, the athlete must perceive the situation as threatening in the sense that s/he believes that an injury is possible or likely. Second, the athlete must believe that s/he does not have the resources to meet the demands of the situation. For instance, an athlete may have doubts that s/he has completely recovered from a previous injury and thus may believe that s/he does not have the physical resources necessary to successfully confront a potentially injurious situation. And third, the athlete would need to determine that an injury would produce aversive consequences. More specifically, the athlete may perceive that an injury would be a form of failure in that it would indicate s/he is no longer capable (at least temporarily) of performing up to expectations.

When an individual makes these negative appraisals and injury anxiety increases, the athlete may respond in task-irrelevant ways. For example, based on pilot interviews (Cassidy & Morgan, 2005), many athletes report that, following return to participation from an injury, they are sometimes distracted by thoughts of reinjury rather than being focused on the task at hand. These thoughts may produce heightened levels of

physiological arousal that are debilitative to performance (Gould et al., 2002). The athletes may also engage in avoidance-type behaviors (Williams, 2001) such as balking (i.e., not completely following through a movement), bracing (i.e., simultaneously activating agonist and antagonist muscles), or hesitating (i.e., being slow to take action). Responses like these are not only likely to have a debilitative effect on performance but could also make the athlete even more susceptible to sustaining another injury.

Measuring General and Sport-Specific Anxiety

Within the field of psychology the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970), a measure of general anxiety, is commonly employed. This measure has also served as a reference for the development of many sport-specific measures of anxiety. Within the field of sport psychology, several instruments have been developed and utilized to assess athletes' levels of competitive anxiety. These instruments include the Sport Competition Anxiety Test (Martens, 1977), the Competitive State Anxiety Inventory (Martens, Burton, Rivkin, & Simon, 1980; Martens et al., 1990), the Sport Anxiety Scale (R. E. Smith, Smoll, & Schutz, 1990), and the Mental Readiness Form (Krane, 1994).

One limitation of both general and sport-specific anxiety measures is that the directional component of the anxiety response is not assessed. The direction of anxiety refers to how athletes interpret "the cognitive and physiological symptoms they experience on a debilitative-facilitative continuum" (Jones, 1995, p. 463). In other words, two athletes who experience very similar physiological or cognitive symptoms of anxiety may interpret those feelings very differently (Jones, 1995; Schachter, 1964). For

example, both athletes may report feelings of “having butterflies” in the stomach; however, one athlete may interpret these feelings as debilitative whereas the other athlete may interpret them to mean s/he is “psyched up.” Earlier, Swain and Jones (1996) demonstrated that individual athletes with the same anxiety intensity scores could experience emotions and cognitive states that were on opposite poles of the debilitative-facilitative continuum. Given that performers can interpret statements on the anxiety measures quite differently, the reliability of these measures may be compromised (Woodman & Hardy, 2001).

State-Trait Anxiety Inventory (STAI)

Prior to Spielberger’s (1966) distinction between state and trait anxiety, researchers (e.g., Cattell, 1957) employed general tests of anxiety to assess the construct. The acceptance of the state-trait distinction led Spielberger and his colleagues (Spielberger et al., 1970) to develop the STAI, a general measure of anxiety that includes both a state and trait scale of anxiety. Although the STAI was not developed for specific use in a competitive sport context, researchers in sport psychology (e.g., Asci, 2003; Dowthwaite & Armstrong, 1984) have employed the STAI to examine the relationships between sport anxiety and a variety of other variables. In addition, some of the initial measures of general sport anxiety (e.g., CSAI, Martens et al., 1980; SCAT, Martens, 1977) were developed based on the STAI.

Although use of the STAI remains common in sport psychology research, some limitations to its use have been discussed. First, the factor structure of the STAI has come into question. Specifically, Tenenbaum, Furst, and Weingarten (1985) noted that several

items on the scale yielded inappropriate responses, shared similar locations on the state-trait continuum, and did not produce equal units of measurement. These drawbacks led Tenenbaum and his colleagues to question the generalizability of anxiety research that has used the STAI as an anxiety measure. A second limitation of the STAI is that it does not differentiate between cognitive and somatic aspects of anxiety. Given the vast amount of research suggesting that these two components of anxiety are independent, the inability of the STAI to differentiate between them limits its usefulness.

Sport Competition Anxiety Test (SCAT)

In response to the notion that situation-specific measures of anxiety would have more predictive power than general measures of anxiety, Martens (1977) developed the SCAT to assess sport-specific trait anxiety. The initial items written for the SCAT were adapted from the STAI (Spielberger et al., 1970) and other measures of general anxiety. The final version of the SCAT consists of 10 statements that reflect an individual's feelings of anxiety. Additionally, five "spurious items were included to direct attention to other elements of competition" (Martens et al., 1990, p. 19-20). Sample items include "Before I compete, I feel uneasy," and "Before I compete, I am nervous." Each item is scored on a three-point scale that ranges from *Hardly ever* (1) to *Often* (3). The SCAT has demonstrated acceptable psychometric properties, with internal consistency values ranging from .95 to .97 and test-retest reliability of .85 in adults (Martens et al., 1990). The psychometric properties of the measure have also been replicated in numerous other studies (e.g., Hanin, 1982; Ostrow & Ziegler, 1978; Rupnow & Ludwig, 1981).

One strength of the SCAT is its usefulness in a wide range of sport research (Burton, 1997). Specifically, the SCAT has been employed in research on competitive trait anxiety, perceptions of threat, predictions of state responses, predictions of motor performance, and performance outcomes (Martens et al., 1990). Like the STAI (Spielberger et al., 1970), the primary weakness of the SCAT is that it does not differentiate between cognitive and somatic anxiety.

Competitive State Anxiety Inventory (CSAI, CSAI-2)

While the SCAT (Martens, 1977) represented a good first step in assessing competitive trait anxiety, it became apparent that it lacked the ability to measure state components of anxiety. Thus, Martens and his colleagues (Martens et al., 1980) modified the state scale of the STAI (Spielberger et al., 1970) and developed the CSAI. At that time, researchers were discussing the importance of distinguishing between cognitive and somatic forms of anxiety (Davidson & Schwartz, 1976; Liebert & Morris, 1967). This new research guided Martens and his colleagues (Martens et al., 1990) to further revise the CSAI, leading to the development of the CSAI-2, a measure of sport-specific state anxiety that assesses both cognitive and somatic components.

The CSAI-2 (Martens et al., 1990) has three 9-item subscales: cognitive state anxiety, somatic state anxiety, and state self-confidence. According to Martens et al., the instrument was originally written to include only the first two subscales. However, when all of the negatively-worded items meant to measure cognitive state anxiety loaded together on one factor and all of the positively-worded items loaded together on a different factor, the positively worded items were retained as a separate factor Martens et

al. labeled self-confidence. The CSAI-2 has demonstrated acceptable psychometric properties, with scale reliabilities ranging from .79 to .83 for the cognitive anxiety subscale, .82 to .83 for the somatic anxiety subscale, and .87 to .90 for the self-confidence subscale (Burton, 1997).

Since its development the CSAI-2 (Martens et al., 1990) has been used in numerous studies examining sport anxiety (Naylor, Burton, & Crocker, 2002). One limitation of the CSAI-2 is the factor structure provided by Martens and his colleagues. Specifically, while the cognitive state anxiety and self-confidence subscales are purported to be interdependent, the two factors have more often emerged as independent factors (Woodman & Hardy, 2001). Martens et al. have suggested that cognitive state anxiety and self-confidence represent opposite ends of a "cognitive evaluation continuum" (p. 129); however, this assertion has not been supported in subsequent research (e.g., Gould, Petlichkoff, & Weinberg, 1984).

Sport Anxiety Scale (SAS)

The SAS (R. E. Smith et al., 1990) was developed as a measure of competitive trait anxiety and consists of three subscales: a seven-item worry scale, a five-item cognitive disruption scale, and a nine-item somatic anxiety scale. Sample items include "I feel my stomach sinking," "I'm concerned about performing poorly," and "My mind wanders during sport competition." Individuals respond to each item on a four-point scale ranging from *not at all* (1) to *very much so* (4). Overall sport anxiety scores from the SAS have been shown to be strongly related to trait anxiety, sport competition anxiety, precompetitive tension, confusion, anger, and depression. The psychometric properties of

the SAS are acceptable, with internal consistency values ranging from .74 to .88 and a seven-day test-retest reliability value of .85. The SAS appears to be a strong multidimensional measure of competitive trait anxiety; however, very few studies have utilized the measure. In one study by Dunn, Dunn, Wilson, & Syrotuik (2000), the three-factor structure of the scale emerged but two items did not load on their intended factor. Thus, further research using the SAS appears needed in order to examine its factor structure and confirm its reliability.

Mental Readiness Form (MRF)

Several sport psychology researchers (Krane, 1994; Martens et al., 1990) have noted that measures used to assess sport anxiety are too lengthy to be used in field settings. In an attempt to address this deficiency, Krane developed the MRF, MRF-2, and MRF-3, which are shorter versions of the CSAI-2 (Martens et al., 1990). All versions of the MRF comprise three items; one for each subscale of the CSAI-2. With the MRF individuals indicate their feelings at the time by placing a mark on each of three lines separating two words: calm and worried (for cognitive anxiety), relaxed and tense (for somatic anxiety), and confident and scared (for self-confidence). With the MRF-2 the word pairs remain the same as the MRF but individuals rate their feelings on an 11-point Likert scale With the MRF-3 individuals use an 11-point Likert scale to indicate where they fall on the following continuums: worried-not worried (for cognitive anxiety), tense-not tense (for somatic anxiety), and confident-not confident (for self-confidence). According to Krane, these items are moderately correlated with the subscales of the CSAI-2 (i.e., correlations range from .54 to .79). In addition, Krane, Joyce, and Rafeld

(1994) reported that items from the MRF support the predicted relationships between both cognitive anxiety and performance and somatic anxiety and performance. Although the MRF appears to be a promising method of quickly assessing competitive anxiety, it has not yet been used extensively in research studies.

Existing Measures of Injury Anxiety/Fear of Injury

To date, three measures of injury anxiety have been developed: one by Kontos et al. (2000), the Tampa Scale of Kinesiophobia (TSK; Miller et al., 1991, cited in Silver et al., 2002), and the Sport Injury Trait Anxiety Scale (SITAS; Kleinert, 2002). The instrument developed by Kontos et al. is injury-oriented but was constructed for use with young athletes between the ages of 10 and 14 years only and is therefore inappropriate for use with college and elite-level athletes.

The TSK is a 17-item questionnaire designed for use with pain patients to measure excessive fear of (re)injury due to movement activities. Participants rate the extent to which they agree or disagree with each of the items on a scale ranging from *strongly disagree* (1) to *strongly agree* (4). The TSK provides separate scores for harm, fear of (re)injury, importance of exercise, and avoidance of activity. TSK scores have exhibited acceptable factorial validity, internal consistency, and test-retest reliability (Silver et al., 2002; Swinkels-Meewisse et al., 2003; Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995; Vlaeyen, Kole-Snijders, Rotteveel, Ruesink, & Heuts, 1995). The primary limitation of the TSK is that it is designed for use chiefly with individuals suffering from various forms of chronic pain (e.g., acute low back pain, chronic fatigue syndrome, fibromyalgia). Therefore, to date it has not been used with athletic populations.

The SITAS (Kleinert, 2002) was designed to measure dispositional anxiety related to injury. However, it appears to have several limitations. First, although the SITAS is purported to be a trait measure of injury anxiety, it contains three factors that represent situational appraisals. For instance, Kleinert hypothesized that injury anxiety is negatively related to situational competence and positively related to situational importance and situational loss of control. Since situational appraisals would be expected to vary considerably over time and across situations, the inclusion of such appraisals in the SITAS compromises the trait conceptualization of the measure. Even if this were not the case, though, Kleinert's conceptualization of sport injury anxiety as a trait is contrary to the results of studies showing that negative feelings associated with injury decrease as the amount of time that has elapsed since the injury increases (McDonald & Hardy, 1990; A. M. Smith et al., 1990). Thus, it appears that sport injury anxiety should be conceptualized as situational rather than fixed. Other drawbacks to the SITAS include the finding that low situational competence has no relationship to trait anxiety and that many of the items on the SITAS lack face validity. For instance, the item "I notice that I am distracted" could be an appraisal made by athletes threatened by failure or not performing well and is not unique to those threatened by injury.

A New Measure of Sport Injury Anxiety

The limitations of the existing measures of fear of injury/injury anxiety suggest the need for that a conceptually sound measure of sport injury anxiety. Based on Lazarus' (1991a) CMRT of emotion and the cognitive appraisal model proposed by Wiese-Bjornstal and her colleagues (1998), it would appear that such a measure should include

items that place respondents in the context of injury (i.e., “When I am injured…;” Schwarz, 1999) and be capable of determining the strength of respondents’ beliefs that aversive consequences will result from injury. In an attempt to determine possible injury appraisals of athletes Cassidy and Morgan (2005) conducted in-depth interviews with previously injured collegiate athletes’. Four of the appraisals they attained from these interviews were related to the aversive physical consequences of injury. They included anxiety related to (a) reinjury, (b) experiencing pain, (c) loss of normal functioning, and (d) loss of athletic ability. A second set of four appraisals related to the aversive psychological consequences of injury. They were anxiety related to (a) having a negative body image, (b) experiencing unpleasant affect, (c) having blocked goals, and (d) having an uncertain future. The final four appraisals related to the perceived aversive social consequences of injury and included anxiety related to (a) experiencing social disconnect, (b) loss of social support, (c) others’ perceptions of the athlete, and (d) letting important others down. In the remainder of this review each of these appraisals is discussed and literature relevant to each cited. Where appropriate, specific quotes from interview participants are included to illustrate the appraisal.

Reinjury

One appraisal pertained to anxiety related to reinjury. This appraisal pattern has been identified in the applied literature (Heil, 2000; Taylor, 1997). An example of this type of anxiety was articulated by one participant who had been reinjured (with the same injury) shortly after returning to participation following a period of rest and rehabilitation. He stated,

> …sometimes after practice my hand's a little sore, and…I just always, I'm always basically thinking about making sure I don't do it again…that's basically it. It's always, it's just always on my mind. It's just in the back of my head…on every throw to, you know, to not break my fingers off.

Experiencing Pain

Another appraisal pattern identified in the Cassidy and Morgan (2005) interviews related to anxiety about experiencing the pain associated with the injury itself and/or with the rehabilitation. This appraisal pattern has also been identified in the existing literature (Taylor, 1997; Udry, Gould, Bridges, & Beck, 1997). Specifically, Taylor noted that pain can result in several negative emotional responses, including loss of confidence and motivation, increased anxiety, and feelings of fear and dread.

Loss of Normal Functioning

Another appraisal pattern pertained to the loss of normal functioning associated with being injured (Tracey, 2003; Udry, Gould, Bridges, & Beck, 1997). Such a loss can include a number of specific deficits, including the inability to walk without the use of crutches, the inability to drive, the inability to open doors, the inability to shower normally, the inability to get around as easily, the inability to get clean, and the inability to sleep normally. Many of these deficits were described by one interview participant, who said,

> I'd need people to get the doors for me. I mean I could do it, but it was a tedious task. Um, let's see, getting a shower, that was kind of tough…just the fact that I had to take a trash bag and wrap up my cast and all that stuff, it was very painful.

> Um, I would try as much as possible not to go up and down stairs. I'd try to get in one area and stay.

Loss of Athletic Ability

Another appraisal pattern concerned injured athletes' perceived loss of athletic ability. Athletes who become injured often experience a decrease in their athletic ability resulting from a loss of strength, a decreased level of fitness, a loss of skill or ability, and loss of weight (Taylor, 1997; Tracey, 2003). This loss of ability may lead to increased anxiety as athletes see so much of what they have worked for slipping away. According to one interview participant,

> One of the worst parts about being injured was knowing that…everything I had worked for up 'til then…in terms of like training and where I am athletically, kind of goes away. And uh, you know when you're out for two months you've got to get back up to your athletic level, you know, your strength level and everything, and uh, and there's nothing you can do about it. You just kind of have to…it's almost like you feel yourself withering away, even though it's not exactly that accurate, but that's how you feel. I started, I'd start losing weight but it wasn't because I was getting thinner. It's because muscle was being replaced with fat.

Having a Negative Body Image

Another appraisal pattern involved the development (or escalation) of a negative body image. According to Krane (2001), female athletes must confront contradictory standards. Specifically, they must work to look "small and toned" as well as "large and muscular" (p. 42). This incongruity impacts female athletes' "body image, eating

behaviors, mental states, and self-presentation" (p. 39). When injured, athletes are even more likely to have a negative perception of their bodies than are non-athletes (Leddy et al., 1994). Thus, when female athletes, who routinely confront issues about their bodies, become injured, they are even more likely to have a negative body image.

Experiencing Unpleasant Affect

Another appraisal pattern involved experiencing an unpleasant affect. For example, injured athletes often experience an increase in negative emotions following an injury (Chan & Grossman, 1988; Gayman & Crossman, 2003; Leddy et al., 1994; Taylor, 1997; Tracey, 2003; Udry, Gould, Bridges, & Beck, 1997; Weiss & Troxel, 1986). The increase in negative affect can have negative implications for an athlete's level of motivation, as was the case with one interview participant who said,

> I could have gotten stronger, but, that, and it's not…hard core depression. It's not terrible, terrible depression. But it's kind of like just a lingering…feeling that keeps you a little, it just kind of keeps you a little melancholy…And because of stuff like that I just didn't have the motivation…All the motivation for it just, there was no motivation for it.

An increase in negative emotions can also affect the way an athlete thinks about him or herself. For example, one interview participant noted, "…like my self-esteem just like goes down so much when I'm injured. Um, and when I'm healthy and like playing well, when you're fit, you just feel good." She also stated, "…when I'm injured…kind of like your self-esteem goes down…'cause when you're injured you're kind of made to feel worthless, sort of, by your coaches."

Having Blocked Goals

Another appraisal pattern pertained to having one's goals blocked. Injured athletes often feel that they are unable, at least temporarily, to achieve their athletic goals (Gayman & Crossman, 2003; Tracey, 2003). This appraisal pattern was expressed by one interview participant when he was asked how he felt when he knew he was not going to be able to participate for an extended period of time as a result of a knee injury. He said, "I cried like a baby. I mean I didn't sniff and all that, but I cried like a baby, because it was like my dreams was on hold." This belief was reflected in several more specific appraisal patterns related to blocked goals. They included a loss of opportunity to improve, a loss of potential, and loss of a competitive advantage.

Lost Opportunity to Improve. Injured athletes can often feel that, due to their inability to participate in sport as a result of injury, they are losing the time and opportunity to improve in their sport. According to one interview participant,

> …it feels like everything is working towards a goal, everything I do, good or bad. Uh, every time I'm practicing, every time I'm lifting, it's making me better…I'm trying to get better all the time. And…when I'm injured…when I can't practice…and that's just how it is, and I just have to sit out for a certain amount of time…it doesn't feel like you're getting better at anything…You just don't feel like you're getting better. You don't feel like you're improving yourself in any way.

Lost Potential. Athletes who become injured may believe that the time they spend in recovery when they are unable to participate in sport negatively affects their chances of reaching their athletic potential. This was voiced by one interview participant

who stated, “Like if I had stayed healthy and had a really great season and had that confidence, maybe I’d be playing really well in college, and I would have all the accolades and whatnot.” From this athlete’s perspective, losing the time to improve diminished his ability to achieve what he once thought was possible.

Lost Competitive Advantage. Injured athletes may think that they are losing their competitive advantage and are “falling behind on the curve.” When asked what the hardest aspect of being injured was, one interview participant responded “I’m a competitive person. I always want to have a competitive edge, and not having that and being at a disadvantage obviously was important. That’s frustrating.”

Having an Uncertain Future

Another appraisal pattern concerned having an uncertain future. Athletes who experience an injury are often faced with a substantial amount of uncertainty concerning both their recovery and their return to play (Udry, Gould, Bridges, & Beck, 1997). For one interview participant,

> …it was just always, constantly questioning what my return would be like. How well…will I be able to get back into the swing of things and pick up from where I left off? And what, what consequences am I going to face in terms of…my athletic ability?

In addition to questioning their recovery and their return, some athletes may experience a great amount of uncertainty concerning the severity of their injury. This uncertainty was vividly illustrated by one interview participant who had experienced a serious injury:

> So I'm just laying on the field, thinking I was going to lose my leg because it was very numb. I was like, oh gosh…and that was a big thought on the ambulance ride…But it was numb and I started thinking, I was like, "Oh gosh. Like, what if I lose my foot? Like screw playing [sport], I want my foot."

Some athletes also confront uncertainty pertaining to the feasibility of their moving on to the next level of their sport. This was a concern for one interview participant, who stated,

> …[an injury] affects [moving on], 'cause every team, you have to go through a physical for every team. It's pretty extensive and they want to know everything about you as far as your body and your health and your mind and stuff. So if you have, if you're a guy that's had quite a few surgeries, then obviously I think that will be a, a knock against you.

Experiencing Social Disconnect

Another injury appraisal pattern involved the experience of being socially disconnected from the team. Some athletes may experience feelings of being socially segregated when they become injured because they are unable to practice and compete with the team and they are less able to interact socially with teammates (Tracey, 2003; Udry, Gould, Bridges, & Beck, 1997; Udry, Gould, Bridges, & Tuffey, 1997). This feeling of separation was expressed by one interview participant, who stated,

> I was around [my teammates]. I just wasn't out there with them. So it was like, I couldn't go through what they was going through, and they couldn't go through what I was going through…But with me, I was out there with them, it was just, I

> wasn't out there with them. They were having fun or they was tired and I wanted to be out there having fun or be tired with them, just because they're my teammates, and that's, that's just how I always felt.

Loss of Social Support

Another appraisal pattern pertained to the loss of social support. Some athletes may feel that they have lost the support of friends and coaches after they experienced an injury (Taylor, 1997; Udry, Gould, Bridges, & Tuffey, 1997). In some instances, as was the case with one interview participant, athletes may lose the support of their coach because the coach no longer sees theme as useful and is more concerned with his or her win-loss record than with the athletes themselves. This was evidenced by one interview participant, who stated, "Just, they don't talk to you as much. They treat you like crap, especially when they don't think there's that much wrong with you, that you should be playing."

In other instances, the loss of social support comes from individuals who once appeared to be very concerned about the athlete. One interview participant illustrated this point when he said,

> I mean I felt like a lot of people that I thought was in my corner, they wasn't really in my corner. 'Cause when I got hurt my cell phone number didn't change, but nobody was calling it. I mean it was a few people calling, but nobody really called like they used to when I first got here and they seen me during…two-a-day practices, when they seen all that in the newspaper and ESPN and stuff like that…I left home as a champion, I came here as a champion, that's how I looked

> at it. And that's, they went crazy. Everybody stopped. The only people that kept calling was my family and my girl's family, and a few of my friends. That's all. Everybody else that was always there whenever you needed something, when you needed two dollars or something, they were "Here you go. Here's two dollars. Here, take five." And then when you got here and got injured you never hear from half those people no more. You can go home and see them and they'd say hi to you, but you could tell if somebody's not being what they used to be. You can look in their eyes and tell they not the same person they was when I was not hurt.

Others' Perceptions of the Athlete

Another appraisal pattern related to others' perceptions of the injured athlete. Some injured athletes may feel that they are valued less as athletes by coaches and teammates (Tracey, 2003). This was the perception of one interview participant, who stated,

> It was like the worst game of our lives, and I got absolutely reamed out on the bus trip home, saying that I was a baby, saying that I was soft…By the coaches…[A]nd we do like these peer evaluations of people, and people rated me like out of 10 as a 5, which is like not, like you just don't, mostly you're like 7s and 8s, and they rated me as like a 5 for my mentality…This is teammates. Because everyone thought that I was just like soft, that I was just like giving up, because nobody knew what [the injury] was. And so, because like they told me like it's just…you just hurt your foot, and that's what [coach] was telling the team.

Some injured athletes may also feel they are valued less by others when they experience a loss of status on the team because they lose their starting role and are forced to take on a different, often less-valued role. This was true for one interview participant, who said, “So I didn’t start but one game that year, but I played in all the games. ‘Um I just rotated, went from starting to a role player.” This was also true for one interview participant who explained,

> Well the fact that somebody’s like taken over your position, and the team was playing very well. ‘Um that was a big thing because I didn’t know if I was going to go in and just be able to, you wish you could go in and just pick up right where you left off but it just doesn’t work that way...[T]hat person who’s taken over for you has been playing and if they’ve been playing well, like [the coaches] don’t want to like change it up. And so even though that spot was like rightfully yours kind of and you worked hard for it, like it’s not anymore, like you’ve lost it. It’s like you were just, like on the bench. So when I came back like I didn’t even play in my normal position. I just went in and I played as a [position] and, because I wasn’t, like I wasn’t ready to go in to play 90 minutes in the back line, and you don’t like sub defenders unless you have to. So um, losing your spot is a big thing.

Letting Down Important Others

A final appraisal pattern involved feelings of letting important others down. Some athletes may feel that they are disappointing important people in their lives when they become injured, including family members, friends, significant others, coaches, and

teammates (Gayman & Crossman, 2003; Tracey, 2003). This notion was voiced by one interview participant, who stated,

> I felt like I was letting a lot of people down…Like all my family, all my girlfriend's family, all my friends. I felt like I came this far for a reason but now I'm letting everybody down because I'm not showing, I'm not doing nothing for them to make them happy.

Although the athletes were disappointed themselves, they felt as though the effect their injuries had on important others was equally significant.

Based on Lazarus's (1991a) CMRT of emotion, a measure of sport injury anxiety should take into account and attempt to assess athletes' appraisals of the aversive consequences of injury. The existing literature and the responses obtained by Cassidy and Morgan (2005) in their interview study suggest several likely candidates for a measure of sport injury anxiety. In summary, these include reinjury, experiencing pain, loss of normal functioning, loss of athletic ability, having a negative body image, experiencing unpleasant affect, having blocked goals, having an uncertain future, experiencing social disconnect, loss of social support, others' perceptions of the athlete, and letting down important others.

Appendix B: Original SIAS

DIRECTIONS: A number of statements that athletes have used to describe their beliefs about injury are listed below. After reading each statement, please indicate how much you agree with the statement. If you have never been injured, please tell us what you think *might* happen if you were ever injured. We ask you to share your true beliefs with us. There are no right or wrong answers. Do not spend too much time on any one statement, but choose the answer that best describes what you believe. Some of the questions may seem repetitive, but please answer ALL questions. Neither your coach nor anyone other than the researcher will see your responses.

Response Set					
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Applicable
SD	**D**	**N**	**A**	**SA**	**NA**

When I am injured…

1.	I miss out on what my teammates are doing.	SD	D	N	A	SA	NA
2.	I am not sure when I will be able to return to my sport.	SD	D	N	A	SA	NA
3.	I am in a lot of pain.	SD	D	N	A	SA	NA
4.	I worry about re-injury.	SD	D	N	A	SA	NA
5.	I can't do a lot of things I can do normally.	SD	D	N	A	SA	NA
6.	I feel helpless.	SD	D	N	A	SA	NA
7.	I face a lot of uncertainty.	SD	D	N	A	SA	NA
8.	Some people think I am mentally weak.	SD	D	N	A	SA	NA
9.	I am letting my coaches down.	SD	D	N	A	SA	NA
10.	My role on the team changes.	SD	D	N	A	SA	NA
11.	I feel anxious about how my body looks.	SD	D	N	A	SA	NA
12.	I lose self-esteem.	SD	D	N	A	SA	NA
13.	I experience throbbing pain.	SD	D	N	A	SA	NA
14.	I become less fit.	SD	D	N	A	SA	NA
15.	Some people turn away from me.	SD	D	N	A	SA	NA
16.	I lose some social support.	SD	D	N	A	SA	NA
17.	I hurt a lot.	SD	D	N	A	SA	NA
18.	It is difficult to do some easy tasks.	SD	D	N	A	SA	NA
19.	I am losing athletic ability.	SD	D	N	A	SA	NA
20.	I don't get to spend as much time with my teammates.	SD	D	N	A	SA	NA
21.	Some people stop calling me.	SD	D	N	A	SA	NA
22.	I lose my competitive advantage.	SD	D	N	A	SA	NA

When I am injured…

23. I have to rely on other people to do things for me.	SD	D	N	A	SA	NA
24. I am losing the chance to improve my technique.	SD	D	N	A	SA	NA
25. I worry that I will lose my starting position.	SD	D	N	A	SA	NA
26. My coaches don't care about me as much.	SD	D	N	A	SA	NA
27. I am anxious about how my body feels.	SD	D	N	A	SA	NA
28. I am letting my family down.	SD	D	N	A	SA	NA
29. Simple tasks can become tedious.	SD	D	N	A	SA	NA
30. I feel socially disconnected from my teammates.	SD	D	N	A	SA	NA
31. I lose some of my athletic skill.	SD	D	N	A	SA	NA
32. I doubt that I will be healthy in the future.	SD	D	N	A	SA	NA
33. I lose the opportunity to improve in my sport.	SD	D	N	A	SA	NA
34. I lose confidence in myself.	SD	D	N	A	SA	NA
35. I can't really be part of the team.	SD	D	N	A	SA	NA
36. I feel like I am worthless.	SD	D	N	A	SA	NA
37. I believe that I will get injured more easily in the future.	SD	D	N	A	SA	NA
38. I am letting my teammates down.	SD	D	N	A	SA	NA
39. Some people think I'm just being a baby.	SD	D	N	A	SA	NA
40. I think that I am more likely to get injured again when I return.	SD	D	N	A	SA	NA
41. I am letting my friends down.	SD	D	N	A	SA	NA
42. I can't achieve my athletic goals.	SD	D	N	A	SA	NA
43. I experience a lot of physical discomfort.	SD	D	N	A	SA	NA
44. I am losing athletic potential.	SD	D	N	A	SA	NA
45. The future of my athletic career is unknown.	SD	D	N	A	SA	NA
46. I experience a loss of motivation.	SD	D	N	A	SA	NA
47. I worry about getting fat.	SD	D	N	A	SA	NA
48. Some people think I am just being lazy.	SD	D	N	A	SA	NA
49. I worry that the same injury will happen again.	SD	D	N	A	SA	NA
50. I worry about losing my athletic physique.	SD	D	N	A	SA	NA
51. Some people think I am faking it.	SD	D	N	A	SA	NA

Appendix C: Demographic Questionnaire

Age: _____ **Sex:** M F

Year in School (circle one): Freshman Sophomore Junior Senior Graduate

Ethnicity: _____

Region of the country: Midwest Northeast Northwest Southeast Southwest

Division of competition (circle one)**:**

NCAA Division I NCAA Division II NCAA Division III NAIA Other

What is your primary sport? _____

What is your position? _____

How many years of experience do you have competing in this sport? _____

Are you a starter? Yes No

Are you a varsity team member? Yes No

Are you a Top 5 member? Yes No

Have you ever been to a sport psychology/mental training consultant? Yes No

Have you ever been to a counselor? Yes No

Have you ever been to an injury support group? Yes No

How many injuries have you had during your collegiate career? _____

IF YOU HAVE NOT EXPERIENCED AN INJURY DURING YOUR COLLEGIATE CAREER, PLEASE SKIP AHEAD TO THE NEXT PAGE. OTHERWISE, PLEASE CONTINUE.

When was your most recent injury? (circle one)

< 2 weeks ago	2 weeks-1 mo. ago	1-3 mos. ago
3-6 mos. ago	6 mos. to 1 yr. ago	> 1 yr. ago

What was your most recent injury? _____

How long were you unable to participate in sport due to this injury? (circle one)

< 2 weeks 2 weeks-1 mo. 1-3 mos. 3-6 mos. 6 mos. to 1 yr. 1 yr. +

How recently did you return to participation following this injury? (circle one)

< 2 weeks 2 weeks-1 mo. 1-3 mos. 3-6 mos. 6 mos. to 1 yr. 1 yr. +

Did you have surgery for this injury? Yes No

How severe do you think this injury was? (circle one)

Extremely Severe Very Severe Somewhat Severe Not Very Severe Not Severe At All

Was this injury (circle one): Acute Chronic

Appendix D: Items for the Revised SIAS

Loss of Athleticism:
19. When I am injured, I am losing athletic ability. (LAA2_19)
22. When I am injured, I lose my competitive advantage (LP1_22)
31. When I am injured, I lose some of my athletic skill. (LAA3_31)
33. When I am injured, I lose the opportunity to improve in my sport. (LP3_33)
44. When I am injured, I am losing athletic potential. (LP5_44)

Being Perceived as Weak:
8. When I am injured, some people think I am mentally weak. (OPM1_8)
39. When I am injured, some people think I'm just being a baby. (OPM4_39)
48. When I am injured, some people think I am just being lazy. (OPM5_48)
51. When I am injured, some people think I am faking it. (OPM6_51)

Pain:
3. When I am injured, I am in a lot of pain. (P1_3)
13. When I am injured, I experience throbbing pain. (P2_13)
17. When I am injured, I hurt a lot. (P3_17)
43. When I am injured, I experience a lot of physical discomfort. (P4_43)

Loss of Social Support:
15. When I am injured, some people turn away from me. (LSS1_15)
16. When I am injured, I lose some social support. (LSS2_16)
21. When I am injured, some people stop calling me. (LSS3_21)
30. When I am injured, I feel socially disconnected from my teammates. (SD3_30)

Reinjury:
32. When I am injured, I doubt that I will be healthy in the future. (UF3_32)
37. When I am injured, I believe that I will get injured more easily in the future. (RI2_37)
40. When I am injured, I think that I am more likely to get injured again when I return. (RI3_40)
49. When I am injured, I worry that the same injury will happen again. (RI4_49)

Letting Down Important Others:
9. When I am injured, I am letting my coaches down. (LIOD1_9)
28. When I am injured, I am letting my family down. (LIOD 2_28)
38. When I am injured, I am letting my teammates down. (LIOD3_38)
41. When I am injured, I am letting my friends down. (LIOD4_41)

Impaired Self-Image:
11. When I am injured, I feel anxious about how my body looks. (BI1_11)
12. When I am injured, I lose self-esteem. (UA2_12)
27. When I am injured, I am anxious about how my body feels. (BI2_27)
47. When I am injured, I worry about getting fat. (BI3_47)

VITA

Camille Cassidy was born in Baton Rouge, LA on September 17, 1980. She graduated from Episcopal High School in 1998 and earned her Bachelor of Arts degree in Exercise and Sport Science and Psychology from the University of North Carolina, Chapel Hill in 2001.

In 2003, Camille earned her Master of Science degree in Kinesiology from The Pennsylvania State University, were she specialized in sport psychology under the direction of Dr. David Conroy. Her thesis was entitled "Children's Self-Esteem Related to School- and Sport-Specific Perceptions of Self and Others."

Upon earning her Master's degree, Camille entered the doctoral program in sport psychology at the University of Tennessee, Knoxville. Here, she taught physical activity courses and Stress Management, co-taught Introduction to Sport and Exercise Psychology, and was a team facilitator for the MBA program. Her research focuses on understanding the psychological precursors to injury. Camille received her Doctor of Philosophy degree from the College of Education, Health, and Human Sciences, with an emphasis in sport psychology, in May 2006.